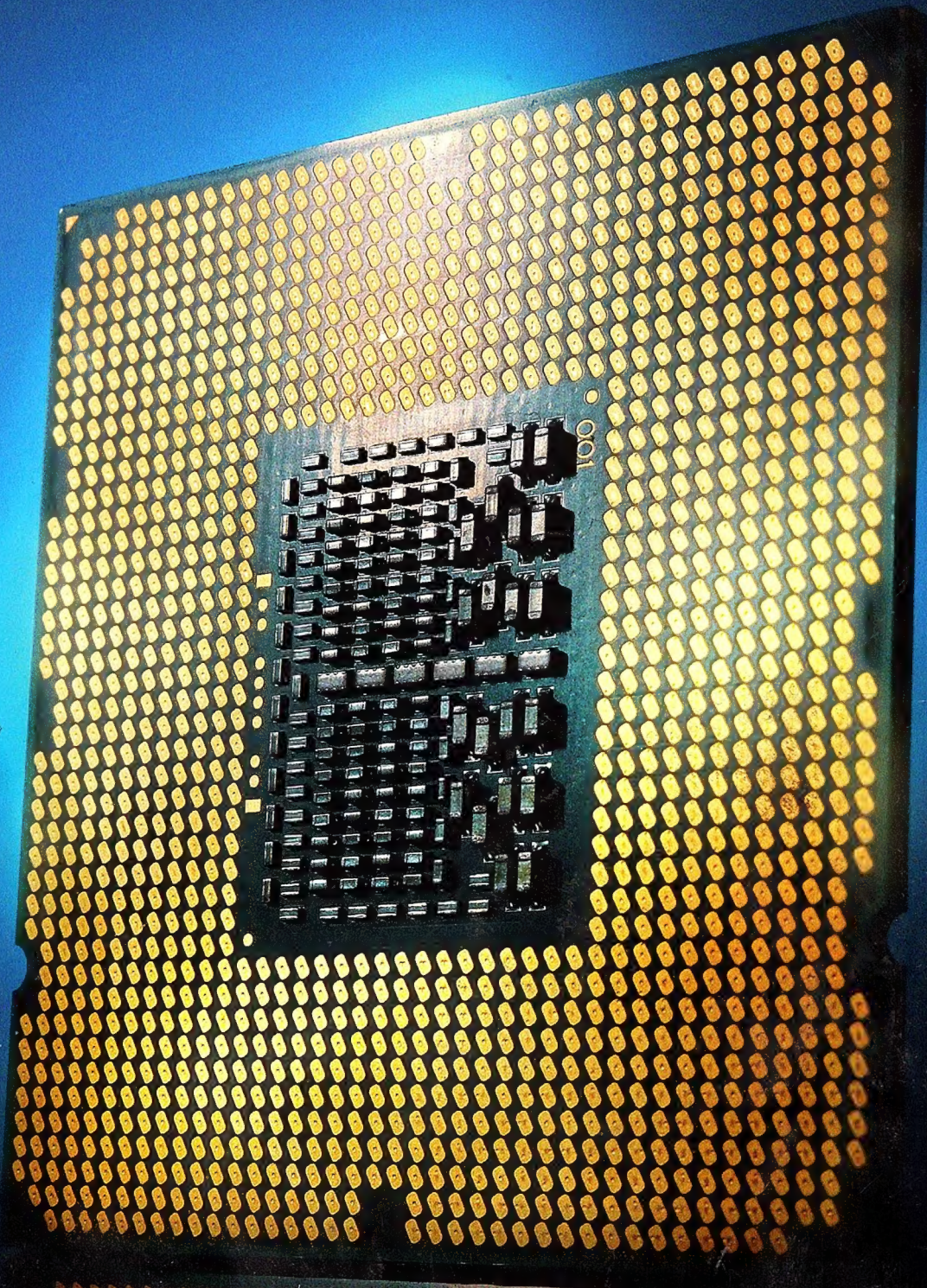


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EDHEAD

The show goes on.

Remember those great Power to the PC events we did last year? Remember how we called it a tour that we were going to be taking all over the place, and then people complained that it was only (only!) Sydney and Melbourne?

Well, tech fans, the tour's still going, and we're very happy to announce that the next leg of the Power to the PC tour is going to pitch up in sunny Brisbane!

For BrisTomicans – a surprisingly numerous breed of Atomican – it's big news, and the date to keep clear is March the 3rd.

It's certainly exciting news for us, too. We get to take some industry greats on the road (we're still working out exactly who, but if

we can get just some of the stars of the first two tours, we're talking awesome times), we get to travel a bit ourselves, and we'll even have a great game to show off to some of our favourite Atomicans – I have very fond memories of the last time we north of the border, some two years ago for an Atomic Live Forum.

(except for the God-awful flu I got up there. BrisVegasans, if you can try not to let your state kill me next time, I'd really appreciate it.)

But that's for then. For now, you're looking at another shiny new issue of Atomic ahead of you.

As usual, it's packed with stuff, but something that is certainly amazing (and maybe alarming) me is the amount of AAA games coming out - this is normally a deadzone following the Xmas rush, but this year...

Well, this issue alone we've got Star Trek Online, Aliens Vs Predator and the epic Mass Effect 2. In coming issues we'll have even more, especially the upcoming Napoleon: Total War – that's a mammoth amount of gaming to get through.

What's a man to do?

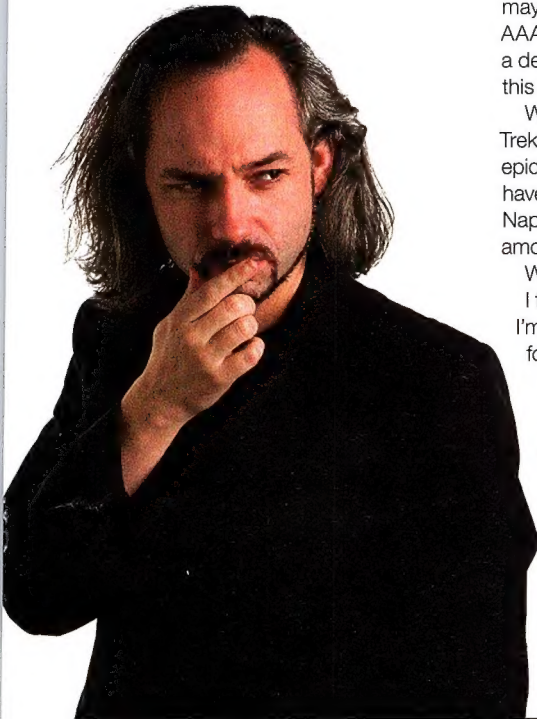
I tell you, by the time we get to Brisbane, I'm going to need a beer – and I look forward to sharing a few with you.

David Hollingworth

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We cannot accept responsibility for unsolicited copy and stress that it may take some time for a reply relating to these submissions to be sent out.

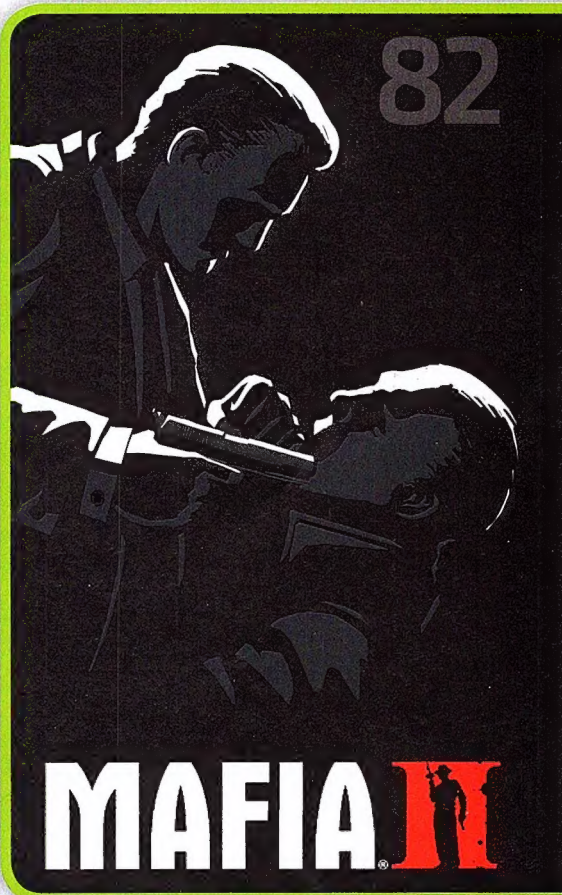
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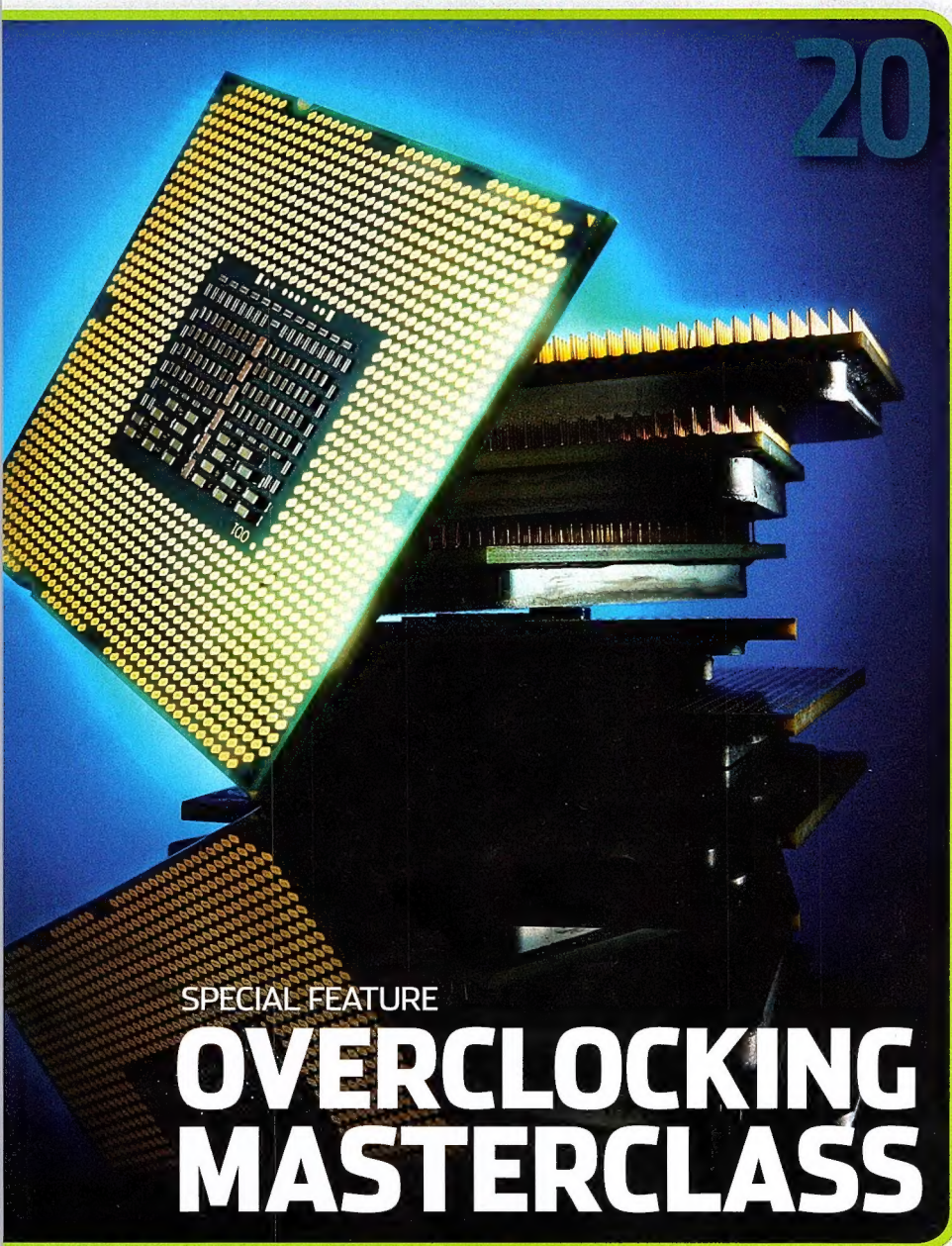
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Clean Feed set to cause headaches

How it works, what it does, and why it's important.

The Clean Feed is essentially Internet Filtering in Australia; soon, it seems, to be placed upon all users of the internet in our country – that is, if Senator Conroy continues to have his way. The very idea of filtering the internet seems preposterously silly at face value but a report given to us by Benjamin D. McGinnes, a systems administrator in the local IT industry, described exactly how the filtering could be achieved.

Mr McGinnes explains that while the Clean Feed was originally intended to remove and restrict access to inappropriate material, it also has the potential to access personal and otherwise private data that is transmitted over the HTTPS protocol. Data such as banking details, passwords and other personal data could be easily picked up by the filter, opening up doors for unscrupulous activities by less-than-reliable administrators of the system.

The filtering methods themselves boil down into three options, each increasingly unlikely. The first is a HTTPS proxy server that

resides between you and the server you're trying to connect to, masquerading as you or the server depending on which end it's communicating with, and monitoring the data that is sent between the two points. In a perfect world the inappropriate material (as listed on a blacklist, surmisably) would be stripped out, but not only could it snoop data that you didn't want it to, it's also difficult to detect its presence unless you know what to look for.

The second method involves a passkey sharing between the destination server and the filter that is placed between there and the client, giving the ability to decrypt the otherwise encrypted information at will, without the client's awareness. The third method is very unlikely, involving a brute force attempt to break into the encryption – but the reality of the issue is



undeniable. While sites like No Clean Feed (<http://nocleanfeed.com>) and others are making waves over the issue, it's still a very good idea to get yourself educated about the Feed before anything happens, or doesn't.

Mr McGinnes' report is available on our site at www.atomicmpc.com.au/pdf/CleanFeedHTTPS-01.pdf

Ancient Windows flaw found after 17 years

You never knew it was there.

A critical flaw has been found in the Windows NT trap handler that makes all Windows machines wide open to hackers. The problem has been a feature of every Windows system for the last 17 years and no one has noticed. According to Full Disclosure, the security hole in Windows allows users with restricted access to escalate their privileges to system level.

It can be done on all 32-bit versions of Windows from Windows NT 3.1 to Windows 7. This is not likely to bother consumers much, but corporate IT managers will be wetting themselves. The problem is caused by flaws in the Virtual DOS Machine (VDM) that was fitted

under the bonnet of Windows NT in 1993 to support 16-bit applications. The VDM is based on the Virtual 8086 Mode (VM86) in 80386 processors and, among other things, intercepts hardware routines such as BIOS calls.

Google security team member Tavis Ormandy worked out how an unprivileged 16-bit program can manipulate the kernel stack of each process and this can enable an attacker to execute code at the system privilege level. To make matters worse he published a sample exploit that runs under Windows XP, Server 2003 and 2008, Vista and Windows 7. It opens a command prompt in the system context, which has the highest

privilege level.

However Ormandy told Microsoft about the vulnerability in mid-2009 and nothing happened.

There is a simple workaround for the flaw, which is to disable the MS-DOS subsystem in Windows. All you have to do is start the group policy editor and enable the "Prevent access to 16-bit applications" option in the Computer Configuration \ Administrative Templates \ Windows Components \ Application Compatibility section.

The workaround reportedly doesn't cause any major compatibility problems for most users if they don't use 16-bit applications.

FROM ATOMIC
ONLINE

2010... My Gods, when did it get to be the future?! Anyway, futureshock aside, some things are the same now as they've ever been, and one thing we strive to keep doing is rewarding the best and brightest of the forums with kudos and acclaim (and a mouse, from Digital World Warehouse) with POST OF THE MONTH! So who's words reign supreme for the first month of the year?

Rion's! Thanks to his excellent and response-provoking post on the radicalisation of PC gaming:
<http://forums.atomicmpc.com.au/index.php?showtopic=26272>

And there's more coolness besides...

Oracle X, for some important life lessons.
<http://forums.atomicmpc.com.au/index.php?showtopic=26859&st=0&p=540295&entry540295>

Saponification gets all reasonable.
<http://forums.atomicmpc.com.au/index.php?showtopic=16490&st=360&p=532368&entry532368>

And **King_TriTAN** lays the smack down in Consoles.
<http://forums.atomicmpc.com.au/index.php?showtopic=26595&view=findpost&p=534477>

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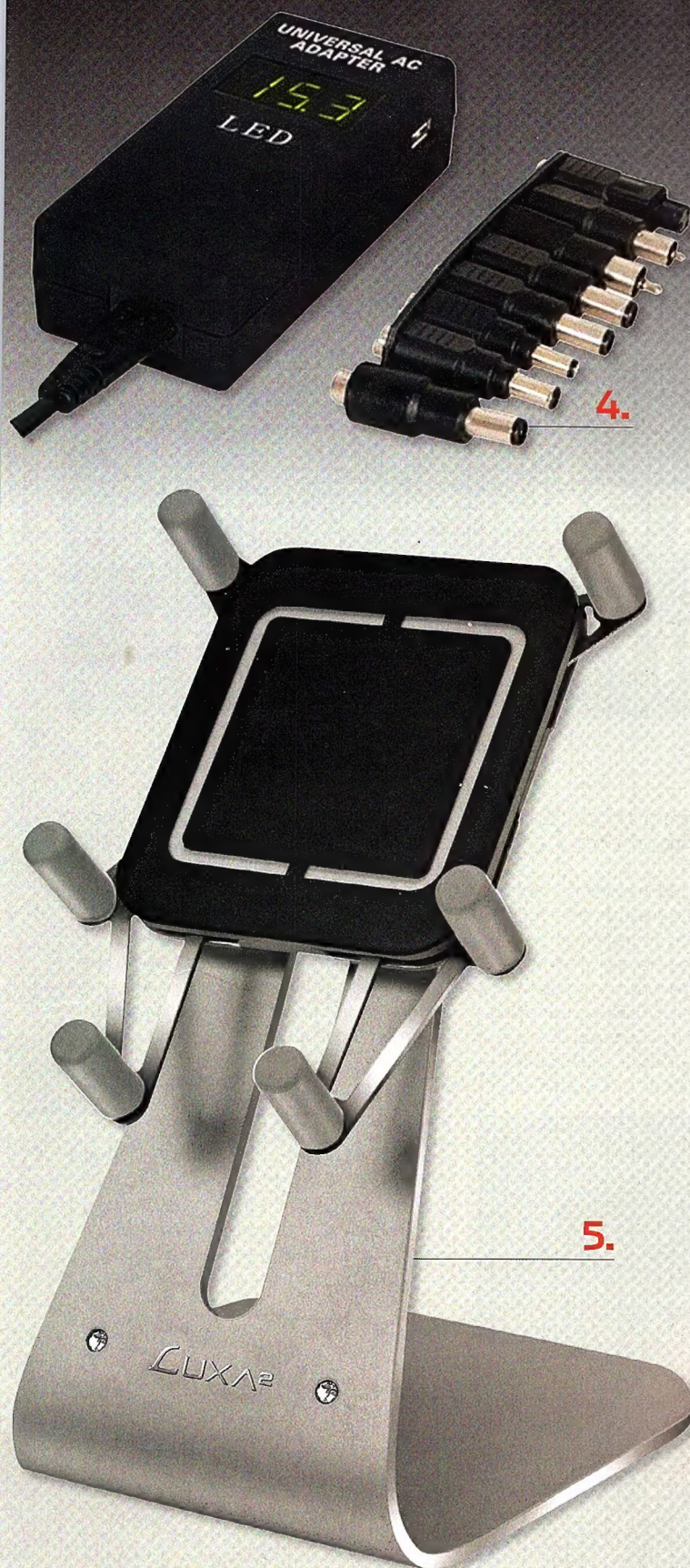
1.



2.



3.



1. Patriot Valkyrie NAS

Price \$215 Website www.patriotmemory.com

While it doesn't come complete with wings, funny helmet or shapely bosoms, the Valkyrie NAS can in fact save you from certain death.

Well, actually, it can't, but it can save you from the sure torture of having your media and data spread all over a network, without rhyme or reason. With up to 4TB of storage, the Valkyrie can handle anything you throw at it (as long, of course, as it's not over 4TB), and can handle BitTorrent downloads, media streaming and double as an iTunes music server.

The addition of web access for all your bumpf (for all values of bumpf) makes this an essential part of any truly Atomic home network – assuming of course you're not building your own storage solutions...

2. AC Ryan Playon!HD

Price TBC Website www.playonhd.spaces.live.com

If you'd rather something a little bit more... versatile than 'just' a NAS, perhaps the AC Ryan Playon!HD is the thing for you.

The Playon!HD enables users to enjoy Full HD media on a big arse TV with full 1080p quality. It supports a wide range of formats and codecs, including but not limited to MKV, H.264, RM/RMVB, AVI, MOV, WMV, ISO and more. The Playon!HD can also centralise all your media, using a user-installable 3.5in harddisk (and supports up to a 2TB harddisk). The unit's also able to play from a mess of attached media: external USB Hard disks, USB Drives, Media cards (SD/SDHC/MS/MSPPro) and from elsewhere on the network, and a wireless adaptor lets you browse YouTube, Flickr and more.

3. Asus uBoom

Price TBC Website www.asus.com

"Like a hammerhead shark alien beast from beyond."

That's how our tech dude and deputy, Justin, described Asus' new laptop oriented speakers. If you can imagine the uBoom with blinking eyes on either end of its barrel o' sound, you're on the same track (or very possibly hallucinating – see a doctor). Regardless, this is a neat addition to any notebook users arsenal – with USB connectivity and a built in rest to jack up your lappy's keyboard, this is awesomely useful.

And it sounds pretty good, too, and that's always a bonus when it comes to speakers.

4. Jaycar 90 watt universal laptop mains adaptor

Price \$79.95 Website www.jaycar.com.au

Now here's something that's seriously useful.

If you're anything like us, you have any number of laptops go through or near your possession – laptops you might be borrowing from work, or looking at to review. Maybe a friend or two have brought theirs around. Regardless, the enemy of the laptop is battery life, and the enemy of battery life is not being able to recharge because you don't have the right fiddly adaptor.

Well, this laptop power supply has 15 adaptors to fit many of the major brand models old and new, including Dell, Apple, HP, Compaq, Toshiba, Sony, Aesuo, Acer, IBM, Lenovo, Fujitsu, NEC, Samsung and Sharp. And it has an LED readout to display the adjusted voltage for whatever connector is fitted. It's not an exciting or sexy product, but we think it's damn handy.

5. Luxa 2 H1-Touch

Price \$59 Website www.luxa2.com

Holding stuff... really, for all our vaunted technological prowess, for all our power over the world around us, we still have to use our delicate hands to actually... hold stuff.

No more!

That's what Thermaktake's new Luxa 2 brand says, anyway, with the H1 Touch device, a sexy aluminium grabby thing that's designed to "hold nothing but your mobile phone". Now that's what we call product specialisation! This ain't no multi-grab device – no hamster-holding, or cup-coddling, and especially no dog-dawdling. You'll need other devices for that – this is just for your phone.

At last, your hands will be free for other, more... useful tasks.

Geographical Information Systems

Jake Carroll peers into the GIS way of life.

Your plane has crash-landed on a tiny island in what you suspect to be the Pacific. There are no nice coconut palms, no hammocks to kick back in, and not a sign of a helpful local. The survivors are in a blind panic because they have no idea where they are. You whip out your trusty GPS enabled mobile phone. Aha! You have cellular network coverage and a GPS signal. You're on the island of 'Greene Punty' which, as it turns out, is somewhere near the republic of Kiribati, too small for any government to care about, unless it involves nuclear

detonation testing. Score one for you. You might just have saved lives; and if not lives, at least some sanity.

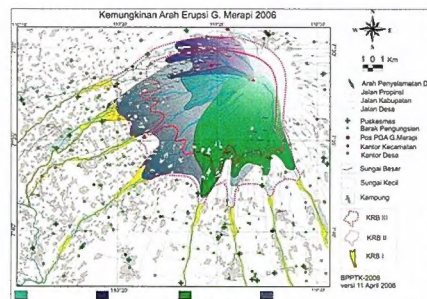
In the movies, information systems are made to look cool, sexy and sometimes arcane. It's all about the zooming in on things from above the earth, then peering into buildings with some kind of magical X-ray and thermal imaging device. The glorious 'eye in the sky' can see everything, everywhere, all of the time. Some random military guy screams 'enhance' and magically, we've got pixel information and bit depth where

there was none before, all powered by the magic of HollywoodOS™. Chill out. They'll spot you and your fellow Lost extras in no time.

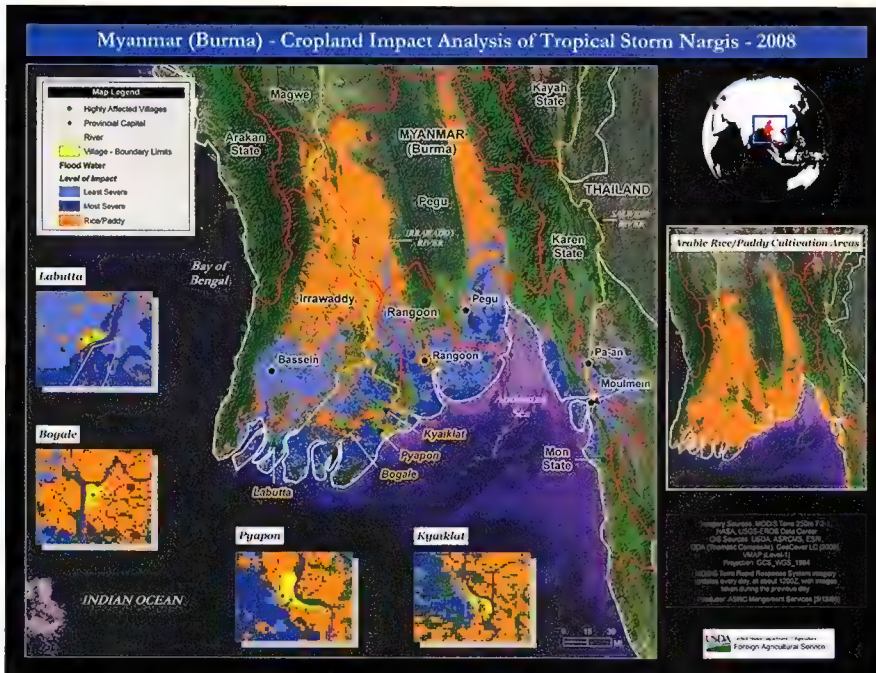
We are made to believe that big brother really is watching us from every angle and we can be seen from space. This month, we're asking you to don that tin foil reflector hat (take off the pirate hat from last month) as we look into the science and spectacular technology of geographical information systems (GIS).

Gimme some of that Unobtainium

James Cameron showed us recently with *Avatar* that three dimensionally visualised geospatial data could be used in numerous ways for good and evil. Cool maps on floating screens manipulated by touch were used to zoom in on a rich deposit of 'Unobtainium' that also



Output from ArcGIS, translated: "Possible direction of eruption, of the mountain of fire".



Cropland impact showing seawater inundation areas, aided via the use of MODIS and Landsat.

happened to be home to an entire race of aliens. Queue environmental impact concerns and a little bit of genocide. Cameron showed us Geographical Information Systems in action.

Back in the real world, GIS has long been an established technology for defence, agriculture, geospatial analysis, environmental conservation, forestry and preventative early warning from natural disasters. GIS can be defined simply as any set of tools or systems that analyse, collate, store and manage data that is in some way linked to a spatial location. More generically, (in modern times) GIS can be considered as any software stack that allows a user to create ad hoc queries to learn something about location based data.

All too often we consider 'systems' intimately linked with computers. The history of GIS dates back to a time long before computers (or any large scale calculation mechanism or machine). GIS dates back to the 1850's in the time of the great cholera epidemic, in London, England.

The GIS used in 1854-55 to track the cholera outbreak was cartography and statistics: locations, times and incidence of cholera outbreaks marked on a paper map. The picture that was built up showed a 'sector' of London with a high density of dots, where each dot represented a case of Cholera. The scientists working on the problem made some inferences about what the density of those dots could mean, and thanks to the map, were able to isolate the infected well within the area with the highest density of outbreaks. The well was shut down and cholera outbreaks ground to a halt. GIS in action.

Today, GIS represents something much larger and more accessible to a wider audience. Google Earth, Maps, WikiMapia, NASA's World Wind, Microsoft Virtual Earth, Bhuvan and

Marble all roll into the picture. The explosion of information (and within this, freedom of information and the information age) has given us resources at our fingertips. Map data, and geospatial data is just a part of that.

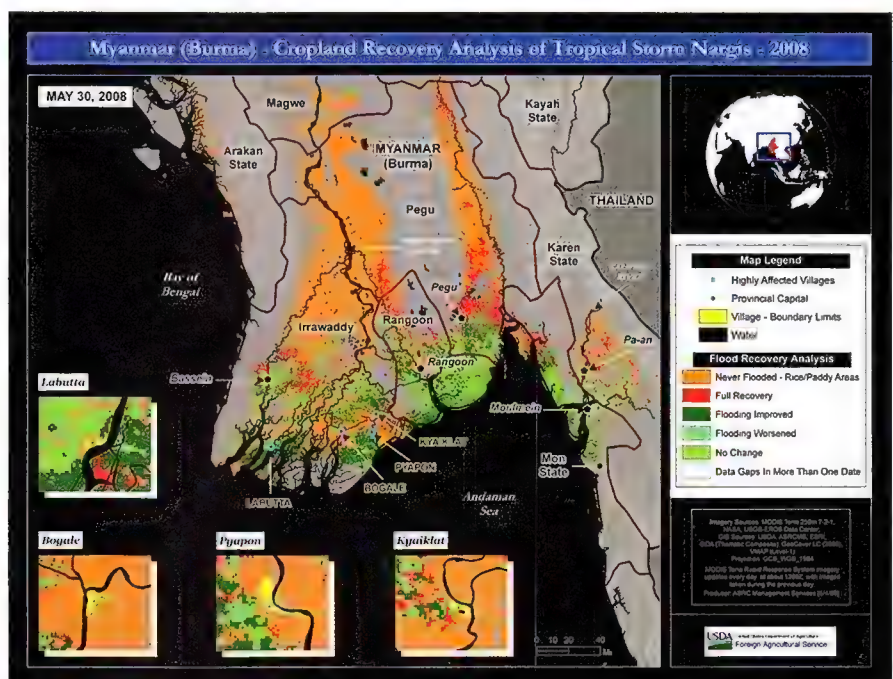
GIS in the real world

GIS has far reaching applications; everything from farming healthier crops to preventing loss of life as a result of natural disasters.

GIS versus the Volcano: In 1006, a Volcano just outside of Yogyakarta, Indonesia erupted, killing many thousands of people. It plastered the entirety of central Java with hot ash and mud. The eruption was so large that it destroyed an entire civilisation and way of life for the Hindu Mataram kingdom. The volcano, known locally as Gunung Merapi (Mountain of Fire) would go on to erupt again in 1786, 1822, 1872, 1930 and then again in 1994. With thousands of lives lost, volcanologists turned to GIS as a means to understand when and where the volcano would erupt again. On May 26th 2006, things were not right. The ground was rumbling, and sensors were crossing safety thresholds. All the while, a group of response-team scientists had been working for months with tools such as ArcGIS to predict the forcefulness of the explosion, the pyroclastic flows and the gas emissions, in a desperate attempt to minimise loss of human life and infrastructure.

Using diverse sensors such as GeoEye (discussed later in this article), ground based seismic vibration monitoring, gas emission detection tools and aerial photography; ArcGIS could build a powerful image of the potential path of destruction.

GIS versus the famine: On May 2nd, 2008, cyclone Nargis hit the coastline of Myanmar (once known as Burma). The storm was so intense, and created such high seas, that it flooded inland area of approximately 5180 square kilometres. More than 90 000 people died. Perhaps more concerning for the long term than the lives lost, was the damage to a vital agricultural industry. The cyclone destroyed much of the prime rice land (Yangon, Mon and



Using tools as diverse as LandSat, USDA, ASRCMS, Esri's ArcGIS and GDA, the FAS were able to determine where recovery could take place, and where total destruction, with no hope of recovery from flooding had occurred. On this basis, foreign aid could be recommended and suggested for areas that needed it most.

Bago), as well as stores and livestock. By the end of the cyclone, 62% of the land used to grow the country's rice had been destroyed through inundation of sea water.

Back in the United States, the FAS (Foreign Agricultural Services) were producing reports about Myanmar's damaged agricultural areas. Using RS-GIS (Remote Sensing) and NASA's moderate resolution imaging spectroradiometer (MODIS), composite sets of images were being put together to understand the true extent of the damage.

Once the extent of the flooding itself had been determined, it was then possible to start working backwards to figure out just how the regeneration of crops would take place, and how the area would recover. Due to the lack of cooperation of the Burmese military, it was very difficult to provide foreign aid effectively or quickly, so the best the rest of the world could do in an attempt to save lives was make some analysis as to the areas that should be prioritised for aid and make recommendations to the Burmese government. The results of the interpolation of



**Global Monitoring
for Security and Stability**

GMOSS. Using the power of many satellites to keep an eye on the planet.

remote sensing data and simple aerial telemetry built a powerful picture of who needed help and who didn't.

GIS on defence: Like so many other clichéd statements about military technology in the world today, war is not waged on foot or by hand, anymore. It is in the sky, inside computers and all about data. The power of GIS is realised in military applications, as so well exemplified by many a war movie.

An exemplification of the continued use of GIS in defence is the GMOSS (Global Monitoring of Security and Stability) system.

Using GMOSS as the network aggregate, a database has been created of the attacks on the gas and oil pipelines in Iraq dating back as far as June 2003 and monitored by the EUSC (European Union Satellite Centre). In attempting to combat terrorism, the database maps the physical infrastructure from imagery and generic cable maps, then overlays the sights of the attacks geospatially to derive relevant security information such as the pipeline sections under more intense attacks, the relationship of the attacks to border proximity and the frequency of the attacks.

Not your mother's kite photography

We now know a little bit more about some of the applications and implications to human life that GIS have created, but how do these systems actually work?

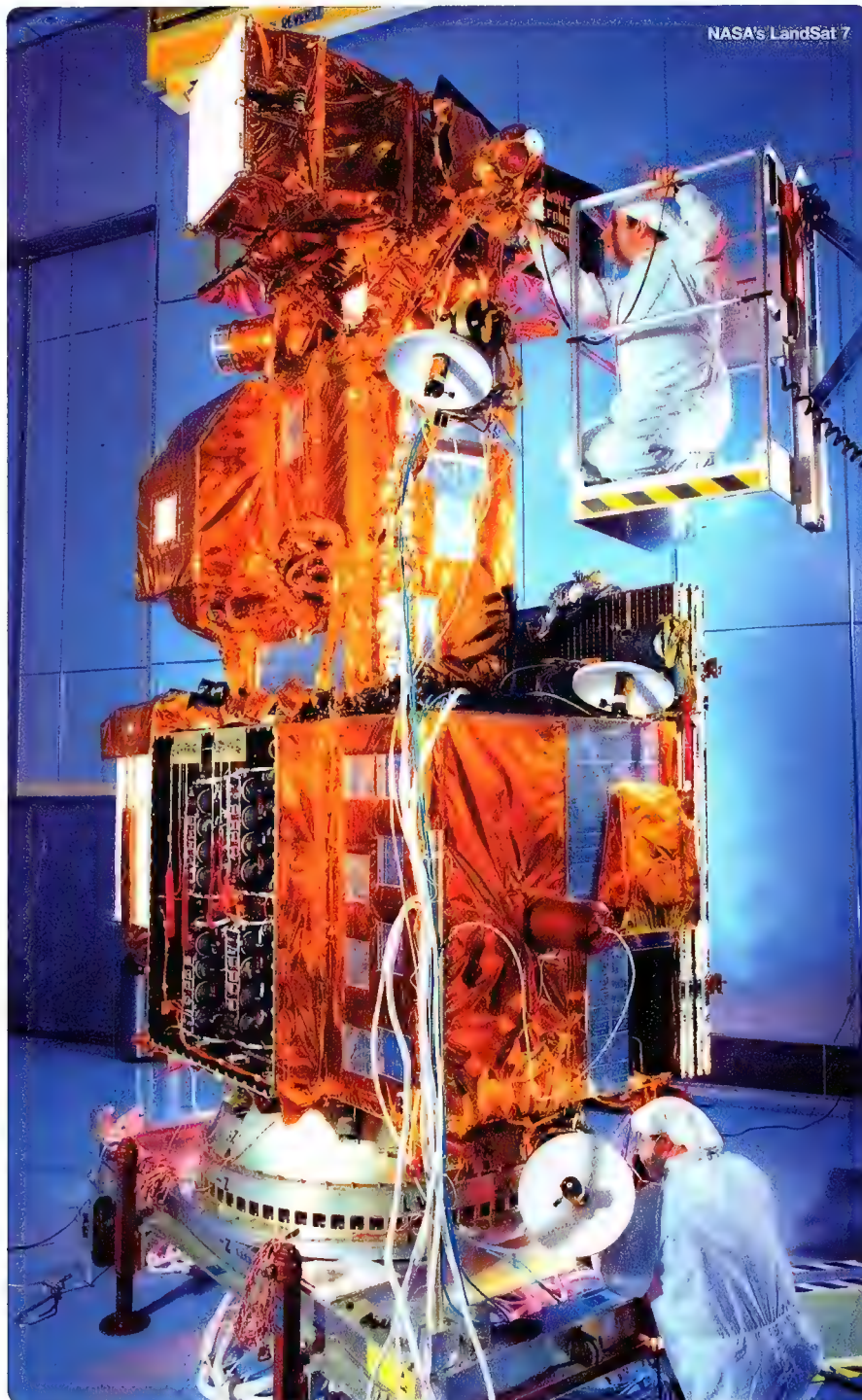
Imaging from above: A common misconception about the images that applications such as Google Earth/Maps display on our mobile devices and computer screens is that all the graphical data comes from satellites. This isn't the case.

The critical difference between scaled out shots and close in photography within Google Maps is the method used to acquire the image. The majority of close up, near ground level graphic data is not Satellite imagery at all, but aerial photography. Notice the different copyright information in the bottom right hand corner of the images in Figure 4 and 5.

The truth is that most map API tools, such as those found on the iPhone, that leverage other software rely upon a relatively small subset of commercial sensors. The most prevalent of the optical sensors are:

NASA's Landsat:

- EMT+(Enhanced Thematic Mapper Plus).



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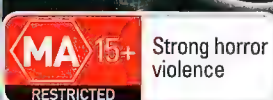


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Looking at Atomic HQ from above, in Google Maps.

- 15m spatial resolution.
- Capable of sending 532 images back to earth per day.
- Onboard storage of around 48GB.
- Single image size of 483MB.

GeoEye:

- GeoEye-1 – Panchromatic and multispectral.
- 41cm spatial resolution.
- Onboard storage of 500GB.
- Single image size of 1.58GB.
- Downlink speed back to earth of 740Mbit/sec.

IRS (Indian Remote Sensing Sat):

- IRS 1A, B, C, D, E, P1 --> 6.
- Panchromatic and multispectral.
- 5.8m spatial resolution.
- Onboard storage of 250GB.
- Single image size of 800MB.

Thematic mapping is a method of creating maps displaying social or physical phenomena, such as population density, life expectancy and climate change. Some hardware in satellite telemetry equipment, such as the NASA Landsat contains 'in silicon' intelligence to accelerate the process of this data collection.

Panchromatic imaging is a technique that uses black and white exposure/CCD sensors that are sensitive to all wavelengths of visible light, not simply those that we choose or deem appealing. Almost all modern 'film' types and CCD sensors could be considered panchromatic.

Multispectral imaging is a technique that is converse to panchromatic methods. It captures image data specific to certain specific wavelengths of light, including some beyond visible wavelengths, such as infrared. This technique can allow us to extract information beyond what our optical receptors can see (red, green, blue) and has a primary use in geospatial imaging.

Spatial resolution is the measure of how closely lines can be resolved as separate entity in an image. If two lines cannot be delineated as two lines from a geospatial satellite image

and are seen as one, its spatial resolution is -1 GSD unit (ground sampling distance). When a specification says a satellite-imaging device has a spatial resolution of 41cm, it means that for objects up to 41cm distance above ground, or in size, the image will depict a unique object.

The critical difference between scaled out shots and close in photography is the method used...

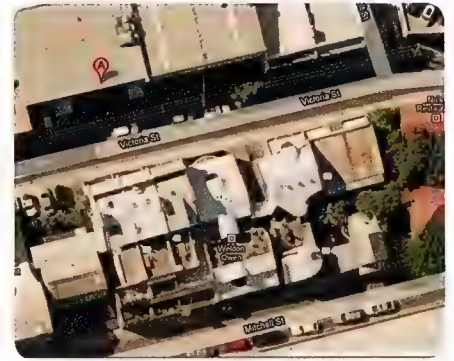
Implications

The implications of GIS are far reaching, as we've discussed, but it has more significant societal impacts on privacy and protection than simply saving lives, or predicting when an earthquake will occur. There are numerous situations, incidences and accounts of governments of the world disallowing general publication of geospatial imagery of their respective nations. The White House roof, the US Capitol, Dick Cheney's house and the NATO C3 Agency, in Brussels are some of the many sites intentionally

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NATO base, mosaic patterned intentionally to prevent the exact design and architecture of the building being revealed.



A closer look at Atomic HQ.
Can you spot the difference?

blurred by Google, to appease the governments of the world.

Questions of equity and ambivalence are then considered, as to just who should have the right, or power to enforce such a blanket on information. Google's seemingly not-so iron will to do good (and not evil!) is tested here. In light of Google's recent announcement concerning strategic removal from China as a result of a lack of information freedom, we can only guess what will happen next. With more location

based services being enabled every day, and augmented reality applications becoming slowly more prevalent as our mobile devices become more capable, it really is only a matter of time before you will find an yourself setting out for the corner store and holding up your phone to the street – and based upon the fact that your device has GPS coordinates for exactly where you're standing, it will tell you where to buy milk at the best price, the sex offenders within 10km, and better yet – where you can go to buy more location enabled devices to increase your geospatial footprint on our little planet. (E)

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I/O OF THE MONTH

More quackers than tweeters

I I've got an MSI Wind U90, and I really want to tackle the patheticness of its internal speakers.

You can see just how piddly the speakers are. They're maybe 5mm deep in total. There isn't really any room to put bigger speakers in their place, but perhaps there are some higher quality speakers that I could swap in? I'm having difficulty Googling such things.

My other thought is to put in a subwoofer of sorts – there is space in the case above what I assume is the northbridge to put maybe a slim 3cm-diameter speaker, maybe something like what's in my Sony V300 headphones.

If you have any other thoughts I'd love to hear them. Could I build a ported driver that was slightly slimmer than a matchbox?

Matthew Semper

O Yes, it is possible to upgrade laptop speakers, and even netbook speakers. Whether it can be done elegantly enough to be worth the effort is questionable, though. It's possible to buy tiny little USB speakers that sound surprisingly decent, these days; I reviewed some esoteric ones some time ago here: dansdata.com/nf01.htm

You can forget about your 'subwoofer' idea, though. You might just possibly be able to cram some sort of headphone driver in there, but getting bass out of an enclosure with almost zero volume is impossible. A single larger driver could easily sound better than two minuscule ones – 'awful stereo' versus 'less awful mono' wouldn't be a bad trade-off – but there just isn't room in there, unless you bulked up the whole case somehow.

Instead, you should take your lead from portable devices with tiny speakers that sound surprisingly good. A MacBook, for instance, or (more helpfully, given netbook dimensions) many mobile phones.

There are three reasons why some phones and laptops sound good, while others sound awful.

1: Driver quality. It only costs a few bucks

to get good one-inch speakers instead of bad ones, but the hardware business is cut-throat.

2: Devious enclosure design, like little open-ended transmission lines winding around the case.

3: Good tiny-speaker designs give up on real bass response from the outset. They use analogue and/or digital equalisation to make sure the tiny speakers never have to try to deal with frequencies below their resonance, which is way up in the hundreds of Hertz.

You can fiddle with this in hardware by just putting a capacitor in series with the speakers, but you can also do it in software. The 'Bass Boost and Low Frequency Protection' feature that debuted in Vista, for instance, lets you boost an arbitrary frequency by an arbitrary amount, and cut all output below that frequency. You can do much the same thing with media-player EQ settings, too.

In your case, though, if you stick with the same tiny drivers shooting down into the desk from their zero-volume enclosures, no EQ twiddling is going to achieve much.

Here are some people talking about relatively minor hardware mods to improve, um, Wind sound:

tinyurl.com/yb3zsqj

Apparently you can just use spray-bottle caps to make tiny sealed speaker enclosures behind the drivers, and that by itself helps considerably. You can even make sort-of-tuned ducts out of drinking straws!

I/O OTM

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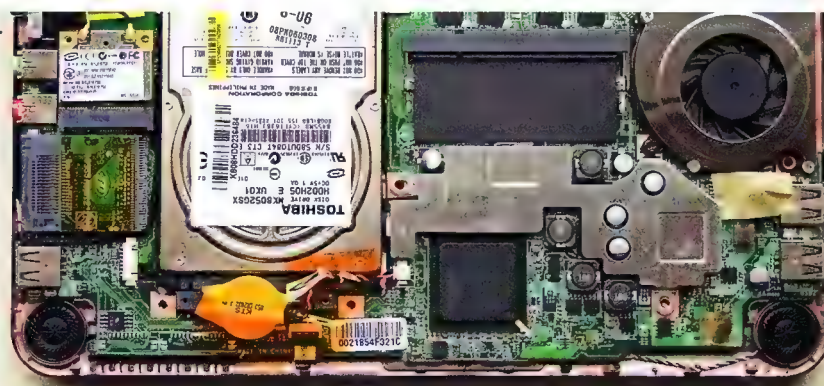


The next step from there is trying actual new drivers that aren't too big to fit. If it were me, I'd try making new speaker grilles on the palm-rest and bodging in larger drivers, with a little bottle-cap enclosure over the back of them, even if the enclosure ended up sticking down from the base of the laptop a bit. That'd tilt the keyboard the wrong way, so you'd have to put taller 'feet' on the back edge, but it wouldn't make the computer much bulkier, and it'd be pretty solid after you hung it on the wall and tossed a bucket of epoxy at it.

The kind of drivers I'd try, if you don't have some junked cellphones and such handy, are the rubber-roll-surround, shiny-dish-cone type that're ubiquitous in cheap iPod speakers these days. Here's an example of the breed from Jaycar:

tinyurl.com/y97gfl5

I'd definitely first make myself a cardboard dummy-driver and see if there's a hope in heck of actually fitting the thing in there, though.



When your laptop's speakers are the same size as the coin-cell backup battery, that's bad.

Repack the RAM bearings, while you're at it

I I have a three-month-old Logitech G15 v2 keyboard, and the space bar has started making an annoying squeaking sound.

I assume this is because the metal bits under the plastic space bar are rubbing. Do you know what type of grease would be suitable for the keyboard without damaging the plastic?

Jeffrey Grace

O A squirt or two of 'silicone spray' – plain light silicone oil in a can – ought to do it. It won't attack plastics (well, not the plastics used in keyboards, anyway), it has very low toxicity, and it hangs around on squeaky plastic things like WD-40 hangs around on squeaky gate hinges. Squirt a *little* on the contact points of the locating pegs and wire bridle doodad that you'll find under the average space bar, and the problem should be solved.

There are a number of other purposes for silicone spray in a PC:

- 1: Stop 'Molex' drive power plugs, and any of the other old-style split-pin plugs, from locking together. Ever been hauling and wiggling the power plug on the back of a drive so hard that you can see the socket flexing around on its solder pads? Shouldn't happen if you give it a shot of silicone spray before plugging it in.
- 2: Stop screws from seizing. A drop of any oil on the threads of, say, a back-of-case thumbscrew, will mean that you won't have to break out a screwdriver to remove a screw you only finger-tightened in the first place. (Real 'galling', where the components practically weld themselves together, usually happens with identical metals – like, an aluminium head-bolt in an alloy engine block. But various dissimilar metals can seize enough to be annoying in a PC-case situation.)
- 4: Recalcitrant side panels. It's quite difficult to remove the side panels from many PCs. A bit of oil on the tabs and slots that hold a sliding panel in place can only help.
- 5: Poke the straw of your big can of silicone spray right through the little air filter on a hard drive, and fill that sucker up! For cooling!

1: Replace all mobo traces with magnet wire...

I I'm trying to measure a device's power usage on the 4-pin Molex cable. My goal is to measure the total power (watt) usage by the device (HDD, optical drive, etc).

The problem is that I can measure currents and voltages in one rail, say, 12V (using DMM). But then, I must do this for 5v as well...

How can I measure current at the same time, so that I don't need to run the test twice?

(Any way to aggregate these two currents using some sort of trick?)

My next advanced project is to measure the PCI Express card power usage, such as drive controller boards. For this, I have looked at PCIe extenders such as this:

<http://tinyurl.com/yeh5qet>

So that I can intercept the current in the middle. (This seems to be the only way...?)

Any help is appreciated.

Dong Jin Lee

O The way you'd do this if you were in a commercial electronics lab is with a multi-input datalogging system, essentially a giant fancy computerised multimeter. You'd set it up with the appropriate wires running through it – or measuring the voltage across appropriate outboard shunts – then run whatever stress tests you wanted, and dump the output to Excel or what-have-you and make graphs.

The simplest way to do the same sort of measurements, without the datalogging, on a domestic budget is to just buy as many cheap multimeters as you need to measure everything at once. For this purpose, your standard yellow \$10 eBay meter will do. If you want to monitor current and voltage at the same time, you'll need two meters per rail you're monitoring.

The quick-and-dirty option is to ignore the voltage and only measure current, and assume that if the computer isn't hanging, all of the rails must be pretty close to their nominal voltage. That only saves you one meter per rail, though; if you're measuring a bunch of different loads simultaneously then you may need one meter to measure the current to each device, because you don't want to try to run everything from a series of Y-adapters from a single current-metered wire.

Note that cheap multimeters usually don't have a current range above ten amps – which is plenty for drives, but not for modern video cards. They also have enough resistance to *maybe* make a difference in high-current situations. Two ways around this are:

1. Put a shunt (a super-low-value, very-well-calibrated resistor) in series with the load and measure the voltage across it. (This is actually what a multimeter does when you put it in its amperage mode, but the ten-amp-mode shunt inside a cheap meter is much thinner, and thus higher in resistance, than a dedicated shunt.)

2. Use 'clamp meters' instead. Clamp meters that can measure DC as well as AC current are now easy to find *relatively* cheaply; you can also get clamp adapters for ordinary multimeters, which read X millivolts per amp or something. The down side of this strategy, beside the extra expense, is that clamp meters are not very accurate.

You could indeed use an extender card with 'breakout' contacts to measure the power consumption of PCIe cards (not graphics cards with their own separate power plugs, of course). I think they should work okay with most cards. You could also try cheating, by insulating the power contact between the slot and the card, and then wedging in a little conductor through which you can hook the terminal on the card up to the appropriate voltage and your ammeter.

This trick is easy to do for big, low-current contacts like the ones in gadget battery compartments. Those, you can shim with a sandwich of aluminium foil, paper and then more foil. PCIe pins only have a 1mm spacing, though, so even if you use nail polish to isolate the slot terminal (which generally works nicely, and can be scraped off when you're done), you're going to have some fiddly work in your future. And if you mess it up, it's easy to short something to ground and blow up motherboard, card or both.



To avoid embarrassment, try to use instruments that're all identically inaccurate.



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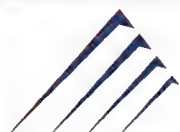


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The waiting game



Ashton Mills just can't help getting his game on.

I tried to resist. It's not like I have copious amounts of time to play games, but it is what I built the grunt into my machine for. There must be some geek code around this that means I have no excuse – I must play games on it, the machine demands it of me. It would be like building a car, and then never driving it.

Then Steam tempted me over the Christmas holidays with a deluge of discounts where my will, and my wallet, gave in. I kind of lost count

Secondly, there's patches. It's an unfortunate truth that a game's release doesn't necessarily signify it's actually complete. Invariably you, the consumer, become the beta tester in the next stage of its cycle, and bugs and balance issues are the meat and veg of the first range of patches. Some games can get away with minor bugs, others have game-breaking flaws that need to be fixed. Not even the resources of giants like Bioware can release bug-free games,

too are likely to be complete and bug-free.

And the fourth is kind of dependent on your upgrade cycle, but games coming out now that bring your machine to its knees will run fast and smoothly on your next system by the time you buy them a year later.

Of course, all this assumes you have the patience of a saint and can hold off your salivating mandibles for a game purchase until at least some months later.

At least you know that if you can, good things really do come to those who wait. ☺

...I realised, for some of the older titles, there was quite the advantage to waiting for the end-of-year sales.

of how many games I did buy, but suffice to say my Steam directory swelled by another 50GB or so.

Among them were some greats I've been meaning to get for a while like Bioshock, Call of Duty 4 (now that it wasn't being sold at a premium to Australians through price discrimination), Overlord II, Gothic 3 (just to try out the 1GB Community Patch mod, see page 86), Jade Empire, Mirror's Edge, Ghostbusters and The Witcher.

I managed to complete three over the hols, gleefully glued to my box. And I realised, for some of the older titles, there was quite the advantage to waiting for the end-of-year sales. It goes like this:

Firstly, of course, there's the price. Sales aside, games go through a scaling decline after the initial retail period. Throw in a sale and you can get AAA titles that once sold for \$80 for a song. Or a tenner.

as the first two critical patches to Dragon Age: Origins showed (and it *still* has annoying bugs).

But if you wait until the price drops on a title, chances are by that time all the major bugs and issues will have been ironed out in patches – so you can actually play a complete game that works as intended. Most of the games I purchased from the sale were patched to the hilt, and it was great knowing I suddenly wouldn't find my game broken after investing an inordinate amount of hours.

Third is modding. Not all games can be modded, and not all those that can might have a decent community, but if mods are available you can usually enhance and even fix the game in ways the original developers didn't. The first thing I do with any game is check out the modding community, and usually I'm pleasantly surprised. Mods however take time to mature, just like the game, but if you're waiting six months or more before buying then the mods

Ashton always comes to those who can wait.

amills@atomicmpc.com.au



OVERCLOCKING MASTERCLASS

We show you how to unlock the hidden potential of your CPU to dramatically increase the performance of your PC!

Overclocking is the art of obtaining the best possible performance no matter what your budget may be. In this step-by-step guide, we show you how to transform a cheap processor into a world beater, and just how much cash you can save in the process.

We show you exactly which settings to apply when overclocking, using standard hardware and sensible overlocks that will run reliably every day for years. Read on to see how to unlock the full potential of your PC.

Contributors: James Gorbould, Antony Leather, Clive Webster.

Handy (and Free) Tools for Overclocking

Every overclocker has a USB flash drive with a library of tools and applications to help monitor the process. Here is a list of some of our favourites, which we talk about in all of our guides:

CPU-Z - www.cpuid.com

This reveals interesting details about your processor, memory and motherboard. It's useful for identifying hardware, confirming the start point of an overclock and verifying that it's been successfully applied.

CoreTemp - www.alcpu.com/coretemp

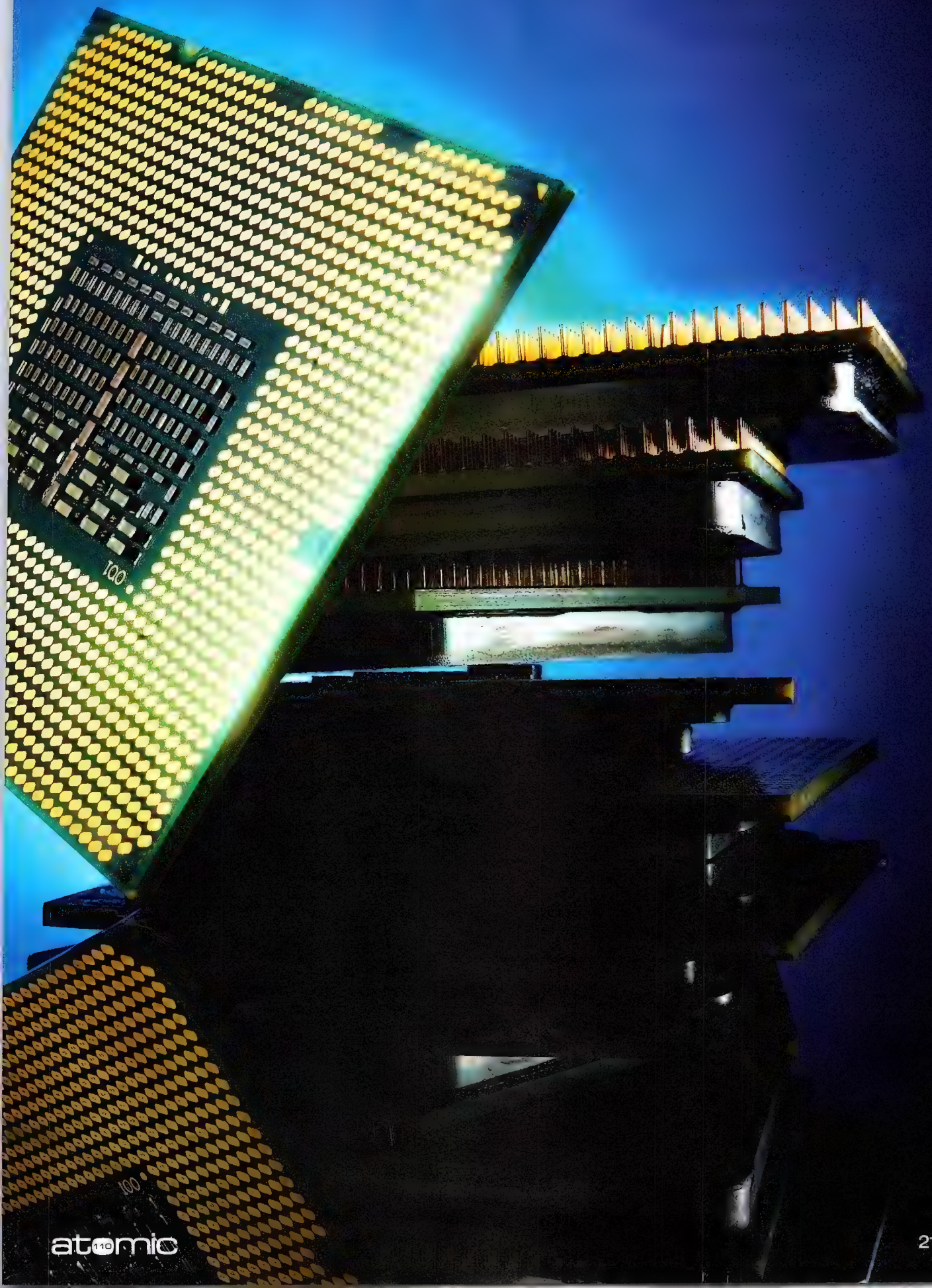
A reliable way to monitor the temperature of your Intel processor - if it's running too hot (80°C or more) then you'll need to check that the cooler is properly mounted or decrease the CPU voltage.

Prime95 - www.mersenne.org/freesoft

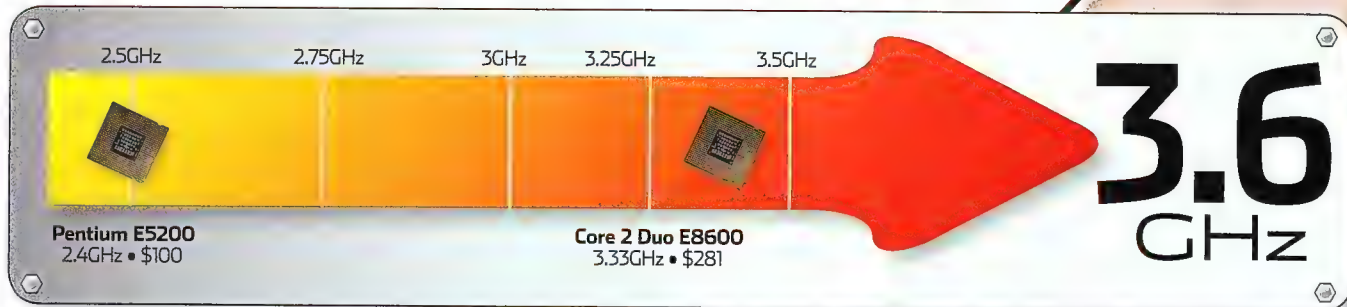
The smallest test of Prime95 fully loads all the processing cores of a processor and is a great way to verify that your overclock is stable. If not, it's back to the BIOS for more tweaking.

AMD OverDrive - <http://game.amd.com>

CoreTemp doesn't work well on AMD processors, but AMD's overclocking tool can monitor CPU temperatures reliably. It can also overclock your processor from within Windows, but we prefer to overclock via the BIOS.



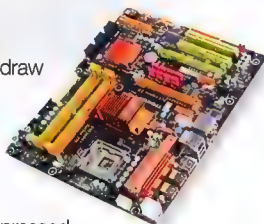
INTEL PENTIUM E5200



What you need

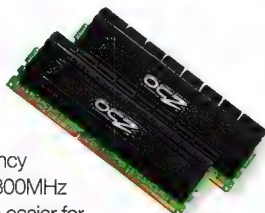
LGA775 motherboard

Due to their comparatively large transistors, many LGA775 CPUs draw a lot of power, so it's imperative that a good overclocking motherboard has excellent cooling for its VRMs. For our testing, we used the excellent Biostar TPower I45, which has impressed us for more than a year.



Dual-channel DDR2 RAM

The overall frequency of the CPU and the memory is linked, so to push the maximum out of your CPU, you need high-frequency memory. A kit that can manage 800MHz is fine, but a 1,066MHz kit will be easier for overclocking. We used 4GB of OCZ Blade 1,066MHz memory.



LGA775 cooler

You need to keep an overclocked processor cool, and the reference cooler isn't up to the job. Good coolers tend to be large, and are also typically quieter than the one with the Intel sticker. For our overclocking, we used the Titan Fenrir TTC-NK85TZ.



The Theory of Overclocking

Intel didn't set out to make Pentium E5200s; instead, it produced a batch of dual-core LGA775 CPUs, some of which ended up as standard Pentiums, and others as Core 2 Duos. This is because no human-made thing is perfect; some CPUs will be able to run at a higher frequency and will be 'speed-binned' as higher-frequency, more expensive models, while others will be binned as slower, cheaper parts.

As all the CPUs are made from same materials in the same factory, the art of overclocking is tricking those slower, cheaper CPUs into thinking that they're really their faster, more expensive siblings. The Pentium E5200 has a frequency of 2.5GHz, which is a result of its 12.5x multiplier and 200MHz FSB (12.5 x 200MHz = 2.5GHz). As the multiplier is locked to 12.5x, to overclock the Pentium E5200, you have to increase the FSB frequency.

However, as the FSB is directly tied to the memory frequency, as you increase the former, you also increase the latter. For this reason, you need to select the appropriate memory divider (aka strap) so that the motherboard doesn't try to run your memory faster than the speed of which it's capable.

As we want the CPU to run at 3.6GHz, rather than 2.5GHz, the CPU will have less time to register a pulse of electricity as a 1 value rather than a 0 (it will have 1/3,600,000 of a second rather than 1/2,500,000 of a second). You therefore need to make these pulses of electricity stronger by increasing the voltage of those signals.

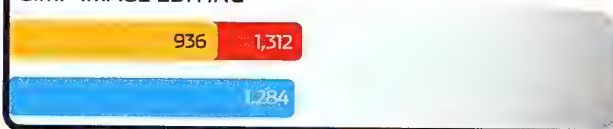
3D - 7% Slower but \$181 cheaper

Crysis (DX10, "High")



Applications - 1% Faster, \$181 cheaper

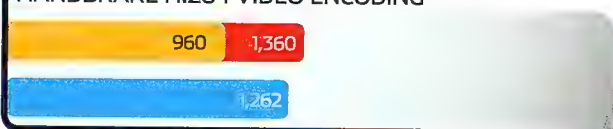
GIMP IMAGE EDITING



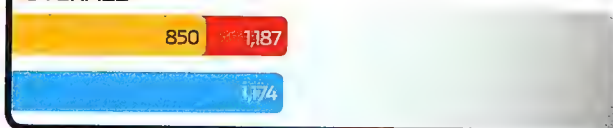
MULTI-TASKING



HANDBRAKE H.264 VIDEO ENCODING



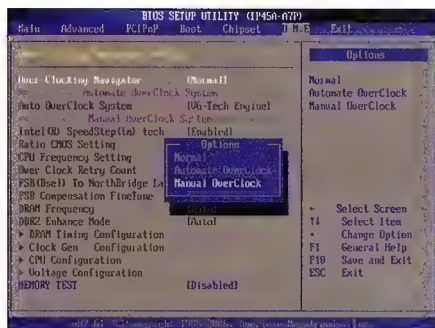
OVERALL



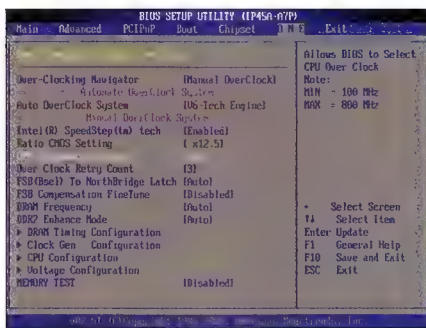
■ E5200 standard/overclocked ■ E8600 standard

Reference PC (Core 2 Duo @2.66GHz, 2GB 1066MHz DDR2 RAM, 250GB HDD, Asus P5K Deluxe) = 1,000

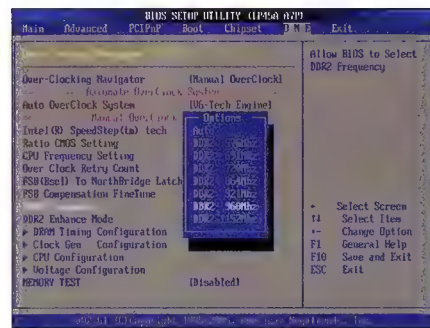
This step-by-step guide explains which BIOS settings you'll need to change in order to overclock your 2.5GHz Pentium E5200 to 3.6GHz using the Biostar TPower I45 motherboard.



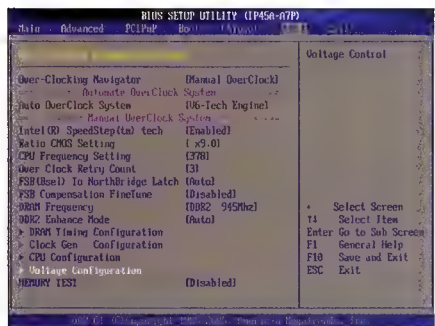
1 To overclock your CPU, you need to unlock the bus speed controls by changing the 'Over-Clocking Navigator' in the 'O.N.E.' from Normal to Manual OverClock.



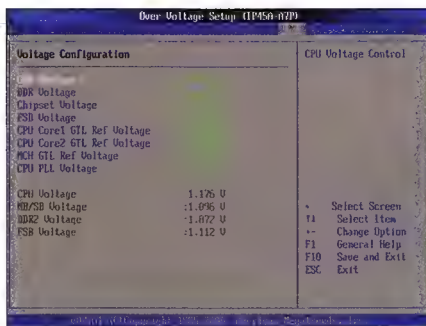
2 Next, you should increase the FSB frequency (see opposite), which Biostar confusingly refers to as the 'CPU Frequency Setting', from its default value of 200MHz. For our target CPU frequency of 3.6GHz, you need to enter a value of 288 (remember, CPU frequency = FSB x CPU multiplier).



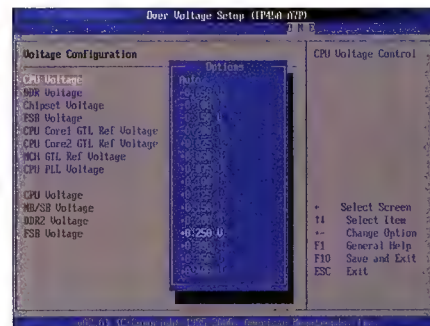
3 However, this means that our memory is now set to run faster than the speed of which it's capable, so we need to adjust its frequency. To do this, find the 'DRAM Frequency' option and select the frequency closest to the maximum speed of your RAM, making sure that it isn't unstable. The BIOS offers six other dividers, but most of these would have either underclocked or overclocked our RAM, affecting performance.



4 You've now set all the frequencies necessary for this overclock, but to make the overclock stable, you also need to overvolt some areas of your system. The voltage settings are stored on the 'Voltage Configuration' sub-menu towards the bottom of the 'O.N.E.'.



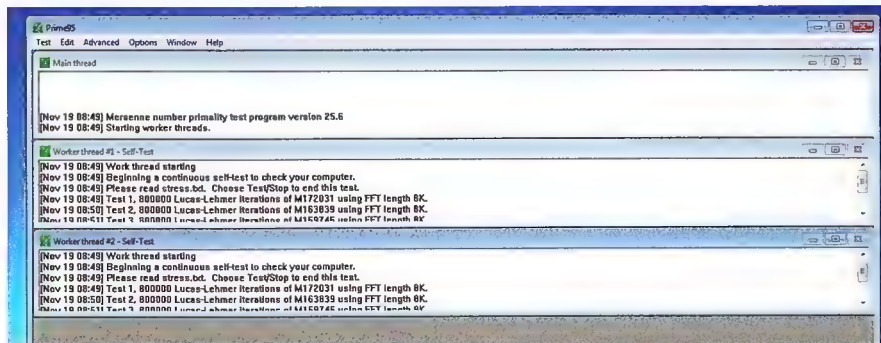
5 Unfortunately, the BIOS doesn't allow you to enter absolute voltages – you have to increase the voltage in increments. Before you start, it's therefore a good idea to check what the 'CPU Voltage' (vid) of your CPU is at the bottom of this screen.



6 Most E5200s will require an extra 250mV to run stably at 3.6GHz, so hit Enter on the 'CPU Voltage' control, scroll down and select '+0.250V'. You can now hit F10 and then press Enter to save these changes. After that, exit the BIOS and restart your PC. If you exit the BIOS without saving these changes, they'll be lost.

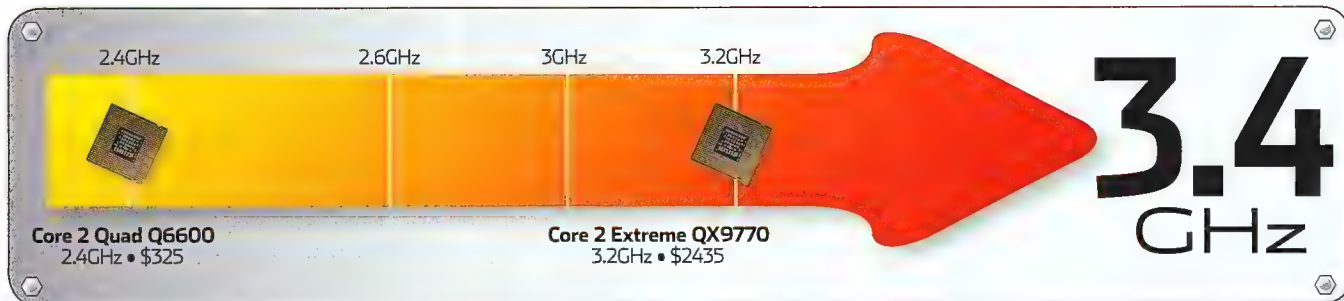


7 Once your PC has rebooted, run CPU-Z again to make sure that your overclock has been applied – the FSB should read 288MHz now, for example, and not 200MHz. Note how the CPU frequency has been boosted from Intel's conservative 2.5GHz to 3.6GHz after just a few BIOS tweaks.



8 An unstable overclocked PC is worse than a stock-speed stable PC, so before proceeding, you should check the stability of your overclock. To do this, run the smallfft test of Prime95 again while checking the CPU temperatures with CoreTemp. You should see no errors from Prime95, and a CPU temperature below 80°C. Finally, run some Benchmarks and games to find out how much faster your PC now runs.

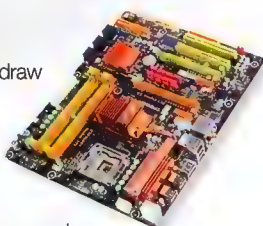
INTEL CORE 2 QUAD Q6600



What you need

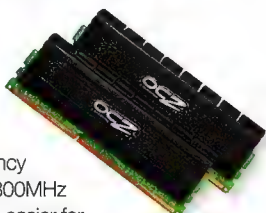
LGA775 motherboard

Due to their comparatively large transistors, many LGA775 CPUs draw a lot of power, so it's imperative that a good overclocking motherboard has excellent cooling for its VRMs. For our testing, we used the excellent Biostar TPower I45, which has impressed us for more than a year.



Dual-channel DDR2 RAM

The overall frequency of the CPU and the memory is linked, so to push the maximum out of your CPU, you need high-frequency memory. A kit that can manage 800MHz is fine, but a 1,066MHz kit will be easier for overclocking. We used 4GB of OCZ Blade 1,066MHz memory.



LGA775 cooler

You need to keep an overclocked processor cool, and the reference cooler isn't up to the job. Good coolers tend to be large, and are also typically quieter than the one with the Intel sticker. For our overclocking, we used the Titan Fenrir TTC-NK85TZ.



The Theory of Overclocking

The Core 2 Quad Q6600 was one of the most successful and desirable quad-core CPUs thanks to its comparatively low cost and great overclocking potential. However, Intel didn't set out to make Core 2 Quad Q6600s; instead, it produced a batch of LGA775 CPUs, some of which ended up as standard Core 2s, and others as Core 2 Extremes. This is because no man-made thing is perfect; some CPUs will be able to run at a higher frequency and will be 'speed-binned' as a higher-frequency, more expensive model, while others will be binned as slower, cheaper parts.

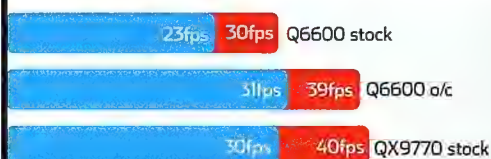
As all the CPUs are made from same materials in the same factory, the art of overclocking is tricking those slower, cheaper CPUs into thinking that they're really their faster, more expensive siblings. The Core 2 Quad Q6600 has a frequency of 2.4GHz, which is a result of its 9x multiplier and 266MHz FSB ($20 \times 133\text{MHz} = 2.66\text{GHz}$). As the multiplier is locked to 9x, to overclock the Core 2 Quad Q6600, you have to increase the FSB frequency.

However, as the FSB is directly tied to the memory frequency, as you increase the former, you also increase the latter.

As we want the CPU to run at 3.4GHz, rather than 2.4GHz, the CPU will have less time to register a pulse of electricity as a 1 value rather than a 0 (it will have 1/3,400,000 of a second rather than 1/2,400,000 of a second). You therefore need to make these pulses of electricity stronger by increasing the voltage of those signals.

3D - 3% Faster, \$2110 cheaper

Crysis (DX10, "High")



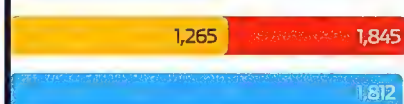
■ Minimum frame rate
■ Average frame rate

Applications - 2% Faster, \$2110 cheaper

GIMP IMAGE EDITING



HANDBRAKE H.264 VIDEO ENCODING



MULTI-TASKING



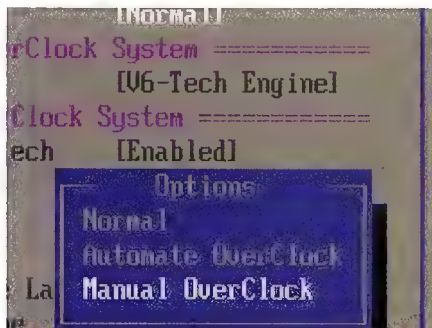
OVERALL



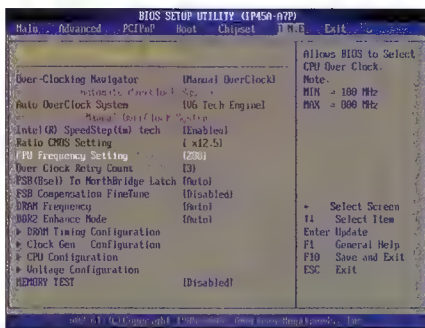
■ Q6600 standard/overclocked ■ QX9770 standard

Reference PC (Core 2 Duo @2.66GHz, 2GB 1066MHz DDR2 RAM, 250GB HDD, Asus P5K Deluxe) = 1,000

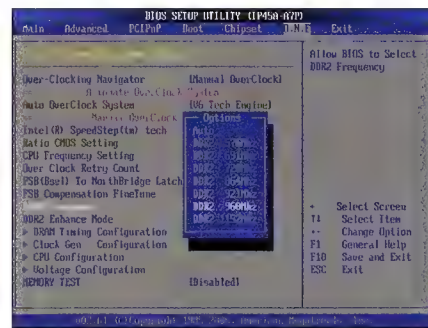
This step-by-step guide explains which BIOS settings you'll need to change in order to overclock your 2.4GHz Core 2 Quad Q6600 to 3.4GHz using the Biostar TPower I45 motherboard



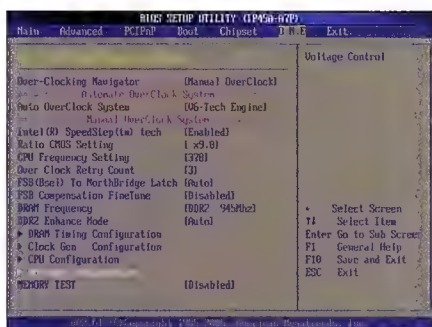
1 As CPU-Z shows that the Q6600 runs at a comparatively low 2.4GHz out of the box, it isn't too hot at gaming or other single-threaded applications.



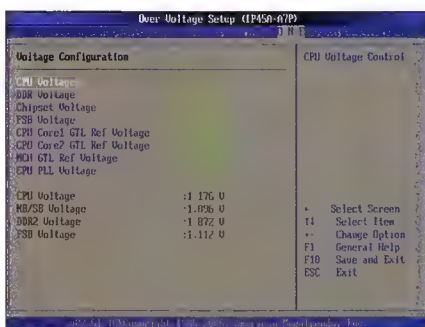
2 To overclock your CPU, you need to unlock the bus speed controls by changing the 'Over-Clocking Navigator' in the 'O.N.E.' from Normal to Manual OverClock.



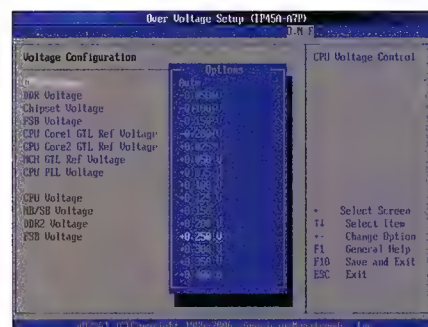
3 Next, you should increase the FSB frequency (see opposite), which Biostar unhelpfully refers to as the 'CPU Frequency Setting' from its default value of 266MHz. For our target CPU frequency of 3.4GHz, you need to enter a value of 378 (remember, CPU frequency = FSB x CPU multiplier).



4 However, this means that the memory is now set to run faster than the speed of which it's capable, so we need to adjust its frequency. To do this, find the 'DRAM Frequency' option and select the frequency closest to the maximum speed of your RAM, making sure that it isn't faster than the speed at which RAM is capable of running. The BIOS offers six other dividers, but these would have either underclocked or overclocked (respectively) our RAM.



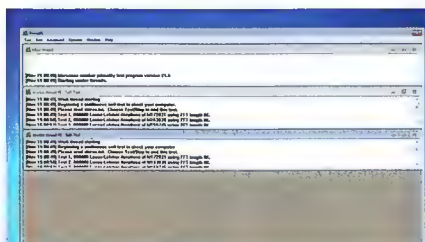
5 You've now set all the frequencies necessary for this overclock, but to make the overclock stable, you also need to overvolt some areas of your system. The voltage settings are stored on the 'Voltage Configuration' sub-menu towards the bottom of the 'O.N.E.'.



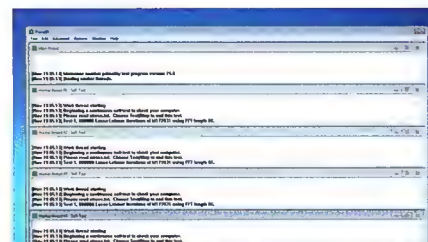
6 Unfortunately, the BIOS doesn't allow you to enter absolute voltages – you have to increase the voltage in increments. Before you start, it's therefore a good idea to check what the 'CPU Voltage' (vid) of your CPU is at the bottom of this screen.



7 Most Q6600s will require an extra 150mV to run stably at 3.4GHz, so hit Enter on the 'CPU Voltage' control, scroll down and select '+0.150V'. You can now hit F10 and then press Enter to save these changes. After that, exit the BIOS and restart your PC. If you exit the BIOS without saving these changes, they'll be lost.

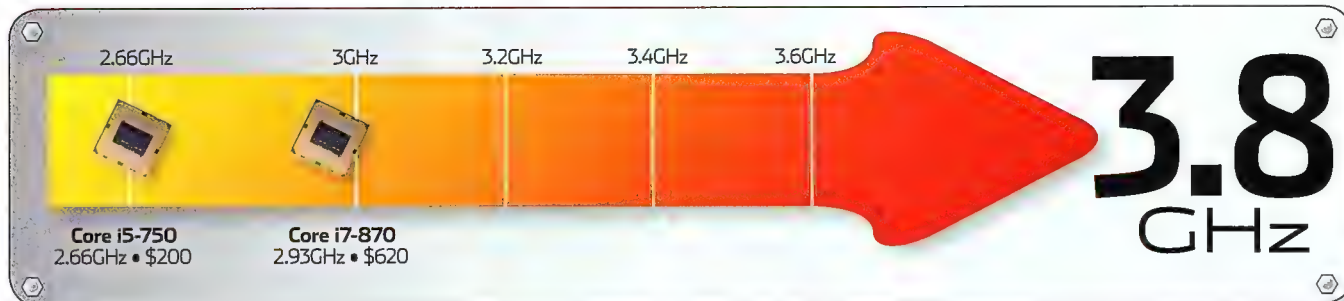


8 Once your PC has rebooted, run CPU-Z again to make sure your overclock has been applied – the FSB should now read 378MHz, for example, and not 266MHz. Note how the CPU frequency has been boosted from Intel's conservative 2.4GHz to 3.4GHz after just a few minutes' work in the BIOS.



9 An unstable overclocked PC is worse than a stock-speed stable PC, so before proceeding, you should check the stability of your overclock. To do this, run the smallffft test of Prime95 again, while checking the CPU temperatures with CoreTemp. You should see no errors from Prime95, and a CPU temperature below 80°C.

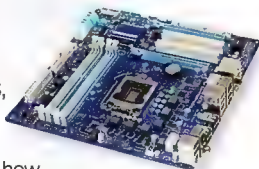
INTEL CORE i5-750



What you need

LGA1156 motherboard

Typically, a good overclocking motherboard will have a user-friendly and comprehensive BIOS, plus effective cooling for all its components. Reading our reviews is a good way to find out how well each motherboard overclocks. For our testing, we used a Gigabyte GA-P55M-UD2.



Dual-channel DDR3 RAM

The overall frequency of the CPU and the memory is linked, so to push the maximum out of your CPU, you need memory that can cope with a relatively high frequency. A kit that can manage 1,333MHz is fine, but a 1,600MHz kit will make overclocking easier. You may also experience problems if you've filled more than two of the memory sockets with DIMMs. We used 4GB of Corsair XMS3 1,600MHz memory.

LGA1156 cooler

You need to keep an overclocked processor cool, and the reference cooler isn't up to the job. Good coolers tend to be large, and also have the benefit of typically being quieter than the one sporting the Intel sticker. For our overclocking, we used the rev 2 of the Titan Fenrir TTC-NK85TZ.



The Theory of Overclocking

Intel doesn't set out to make Core i5-750s; instead, it produces a batch of LGA1156 CPUs, some of which will end up as Core i5s, and others as Core i7s. This is because no man-made thing is perfect; some CPUs will be able to run at a higher frequency and will be 'speed-binned' as a higher-frequency, more expensive model, while others will be binned as slower, cheaper parts.

As all the CPUs are made from same materials in the same factory, the art of overclocking is tricking those slower, cheaper CPUs into thinking that they're really their faster, more expensive siblings.

The Core i5-750 has a frequency of 2.66GHz, which is a result of its 20x multiplier and 133MHz Base Clock (20 x 133MHz = 2.66GHz). As the multiplier is locked to 20x, to overclock the Core i5-750, you have to increase the Base Clock frequency.

However, as the Base Clock is directly tied to the memory frequency, as you increase the former you also increase the latter. For this reason, you need to select the appropriate memory divider (aka strap) so that the motherboard doesn't try to run your memory faster than the speed of which it's capable.

As we want the CPU to run at 3.8GHz, rather than 2.66GHz, the CPU will have less time to register a pulse of electricity as a 1 value rather than a 0 (it will have 1/3,800,000 of a second rather than 1/2,666,666 of a second). You therefore need to make these pulses of electricity stronger by increasing the voltage of those signals.

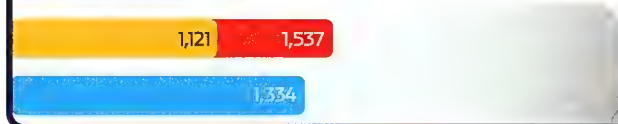
3D - 19% Faster, \$420 cheaper

Crysis (DX10, "High")



Applications - 13% Faster, \$420 cheaper

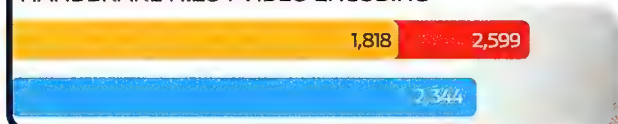
GIMP IMAGE EDITING



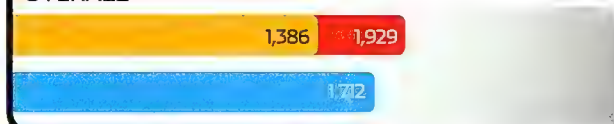
MULTI-TASKING



HANDBRAKE H.264 VIDEO ENCODING



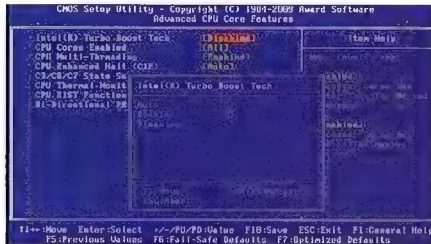
OVERALL



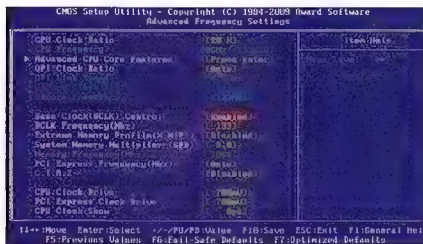
■ i5-750 standard/overclocked ■ i7-870 standard

Reference PC (Core 2 Duo @2.66GHz, 2GB 1066MHz DDR2 RAM, 250GB HDD, Asus P5K Deluxe) = 1,000

This step-by-step guide explains which BIOS settings you'll need to change in order to overclock your 2.66GHz Core i5-750 to 3.8GHz using the Gigabyte GA-P55M-UD2 motherboard.



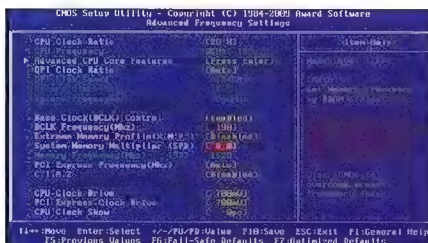
1 The first step is to disable Turbo Boost, as this will mess up your overclock. You can find the Turbo Boost control by entering the 'MB Intelligent Tweaker' menu, then the 'Advanced Frequency Settings' sub-menu and finally going to 'Advanced CPU Core Features'.



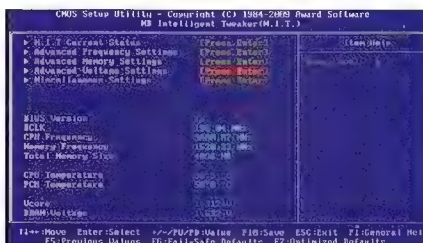
2 You can now increase the Base Clock (see opposite). Back in the 'Advanced Frequency Settings' menu, you need to enable Base Clock (BCLK) Control, which gives you manual control over the Base Clock frequency so that you can overclock the CPU.



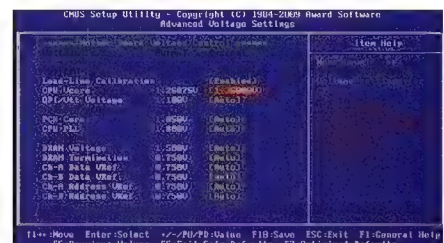
3 Next, you should increase the Base Clock from its default value of 133MHz. For our target CPU frequency of 3.8GHz, you need to enter a value of 190MHz (remember, CPU frequency = Base Clock x CPU multiplier).



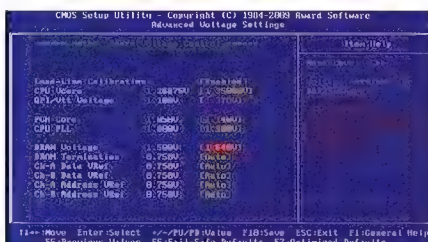
4 However, this means that our memory is now set to run faster than the speed of which it's capable, so we need to adjust its frequency. To do this, find the 'System Memory Multiplier (SPD)' option and select '8' – this is the highest multiplier we could use while keeping the memory within its rated 1,600MHz frequency. The BIOS offers two other dividers, '6' and '10' – but these underclocked and overclocked (respectively) the RAM, so neither divider was ideal.



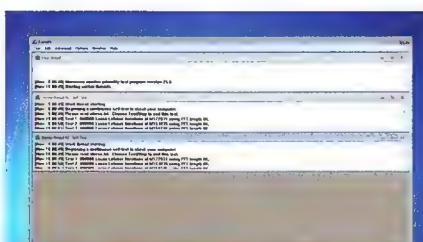
5 You've now set all the frequencies necessary for this overclock, but to make the overclock stable, you also need to overvolt some areas of your system. To do this, return to the 'MB Intelligent Tweaker' menu and enter the 'Advanced Voltage Settings' sub-menu.



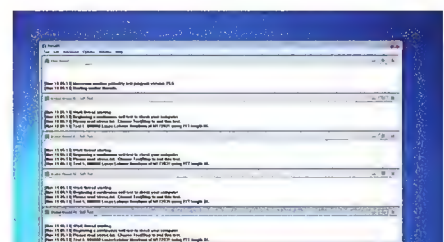
6 Make sure that 'Load-Line Calibration' is enabled and then type in a 'CPU Vcore' (CPU voltage) value of 1.35V. Some CPUs may require a little more vcore than this to run stably at 3.8GHz, but we wouldn't recommend going beyond 1.425V unless you have extremely good CPU cooling.



7 Finally, in the same menu, you should increase the 'QPI/VTT' to 1.37V, the 'PCH Core' (P55 chipset) to 1.14V, the 'CPU PLL' to 1.9V and the 'DRAM Voltage' to 1.64V. You can now hit F10 and then press Enter to save these changes; after that, exit the BIOS and restart your PC. If you exit the BIOS without saving these changes, they'll be lost.

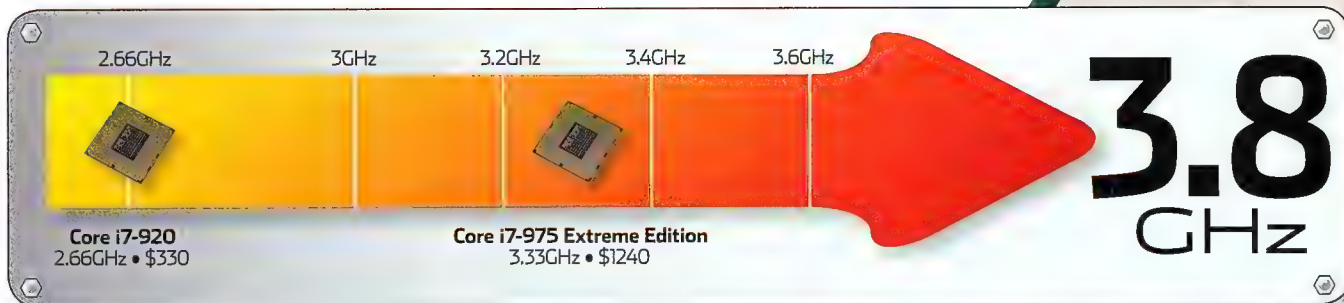


8 Once your PC has rebooted, it's worth running CPU-Z again to make sure your overclock has been applied – the Base Clock should read 190MHz now, for example, and not 133MHz. Note how the CPU frequency has been boosted from Intel's conservative 2.66GHz right up to 3.8GHz after just a few minutes work in the BIOS.



9 An unstable overclocked PC is worse than a stock-speed stable PC, so before proceeding, you should check the stability of your overclock. To do this, run the smallfltt test of Prime95 again while checking CPU temperatures with CoreTemp. You should see no errors from Prime95, and a CPU temperature below 80°C. All should be well.

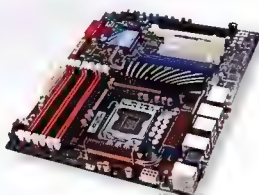
INTEL CORE i7-920



What you need

LGA1366 motherboard

Typically, a good overclocking motherboard will have a user-friendly and comprehensive BIOS, plus good cooling for all its components. Reading our reviews is a good way to find out how each motherboard overclocks. For our testing, we used an Asus P6TD Deluxe.



Triple-channel DDR3 RAM

The overall frequency of the CPU and the memory is linked, so to push the maximum out of your CPU, you need high-frequency memory. A kit that can manage 1,333MHz is fine, but a 1,600MHz kit will be easier for overclocking. We used 6GB of Corsair XMS3 1,600MHz memory.



LGA1366 cooler

You need to keep an overclocked processor cool, and the reference cooler isn't up to the job. Good coolers tend to be large, and also have the benefit of typically being quieter than the one with the Intel sticker. For our overclocking, we used the Titan Fenrir TTC-NK85TZ.



The Theory of Overclocking

Intel doesn't set out to make Core i7-920s; instead, it produces a batch of LGA1366 CPUs, some of which will end up as standard Core i7s, and others as Core i7 Extreme Editions. This is because no man-made thing is perfect; some CPUs will be able to run at a higher frequency and will be 'speed-binned' as higher-frequency, more expensive models, while others will be binned as slower, cheaper parts.

As all the CPUs are made from same materials in the same factory, the art of overclocking is tricking those slower, cheaper CPUs into thinking that they're really their faster, more expensive siblings. The Core i7-920 has a frequency of 2.66GHz, which is a result of its 20x multiplier and 133MHz QPI ($20 \times 133\text{MHz} = 2.66\text{GHz}$). As the multiplier is locked to 20x, to overclock the Core i7-920, you have to increase the QPI frequency. However, since the QPI is directly tied to the memory frequency, as you increase the former, you also increase the latter. For this reason, you need to select the appropriate memory divider (aka strap) so that the motherboard doesn't try to run your memory faster than the speed of which it's capable. As we want the CPU to run at 3.8GHz, rather than 2.66GHz, the CPU will have less time to register a pulse of electricity as a 1 value rather than a 0 (it will have 1/3,800,000 of a second rather than 1/2,666,666 of a second). You therefore need to make these pulses of electricity stronger by increasing the voltage of those signals.

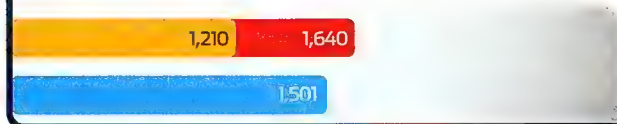
3D - 20% Faster, \$810 cheaper

Crysis (DX10, "High")



Applications - 10% Faster, \$810 cheaper

GIMP IMAGE EDITING



MULTI-TASKING



HANDBRAKE H.264 VIDEO ENCODING



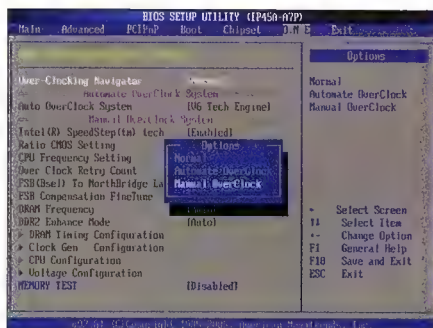
OVERALL



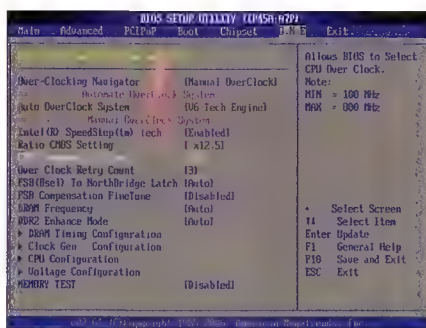
Legend: Red bar = i7-920 standard/overclocked, Blue bar = i7-975 Extreme Edition standard

Reference PC (Core 2 Duo @2.66GHz, 2GB 1066MHz DDR2 RAM, 250GB HDD, Asus P5K Deluxe) = 1,000

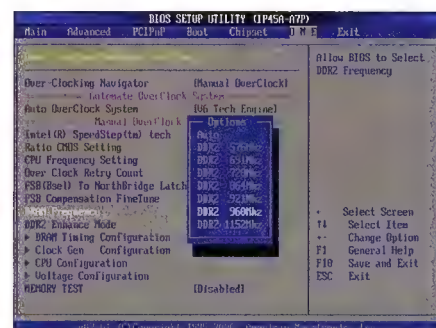
This step-by-step guide explains which BIOS settings you'll need to change in order to overclock your 2.66GHz Core i7-920 to 3.8GHz using the Asus P6TD Deluxe motherboard.



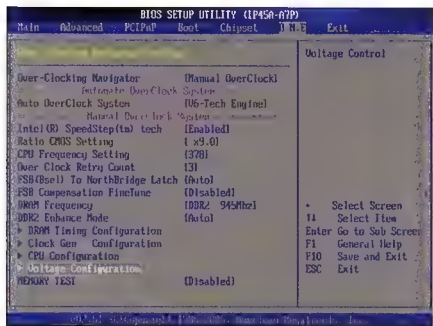
1 The first step is to change the 'AI Overclock Tuner' in the 'AI Tweaker' menu from Auto to Manual. This will allow you to adjust all the bus speeds that you'll need to tweak in order to overclock your PC.



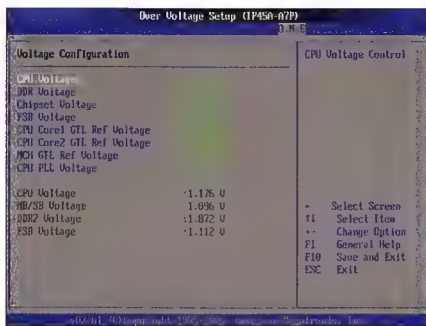
2 The Asus P6TD Deluxe has a nifty automatic overclocking feature that will try to raise the CPU multiplier from 20x to 21x. However, as this will hamper our overclock, we need to force the CPU multiplier to 20 in the 'CPU Ratio Setting'.



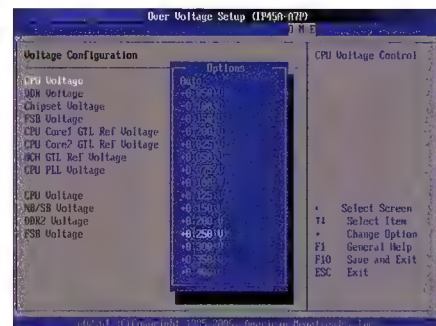
3 Next, you should increase the QPI frequency (see opposite), which Asus confusingly refers to as the 'BCLK Frequency' from its default value of 133MHz. For our target CPU frequency of 3.8GHz, you need to enter a value of 190 (remember, CPU frequency = QPI x CPU multiplier).



4 However, this means that our memory is now set to run faster than the speed of which it's capable, so we need to adjust its frequency. To do this, find the 'DRAM Frequency' option and select the frequency closest to the maximum speed of your RAM, making sure that it isn't faster than the speed at which the RAM is capable of running. The BIOS offers six other dividers, but these would have either underclocked or overclocked (respectively) our RAM.



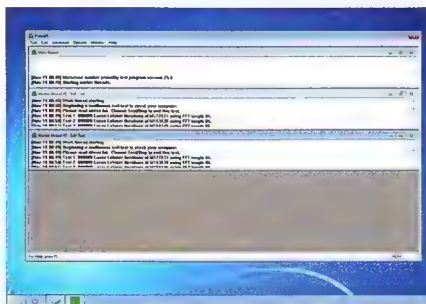
5 You've now set all the frequencies necessary for this overclock, but to make the overclock stable, you also need to overvolt some areas of your system. Firstly, type 1.275V into the 'CPU Voltage', then 1.9V into the 'CPU PLL Voltage'. However, be aware that some CPUs may require a little more vcore to run stably at 3.8GHz, but we wouldn't recommend going beyond 1.45V unless you have extremely good CPU cooling



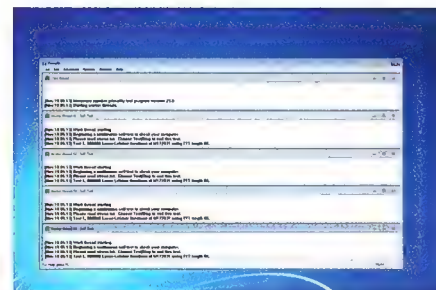
6 Most triple-channel DDR3 memory needs around 1.65V to run at its maximum rated frequency. However, the BIOS doesn't allow you select 1.65V exactly – it offers only 1.64V and 1.66V. As the latter is slightly higher than the maximum recommended voltage, we entered a value of 1.64V in the 'DRAM Bus Voltage'.



7 Finally, you should disable both the 'CPU Spread Spectrum' and 'PCIe Spread Spectrum' options. You can now hit F10 and then press Enter to save these changes; after that, exit the BIOS without restarting your PC. If you exit the BIOS without saving these changes, they'll be lost.

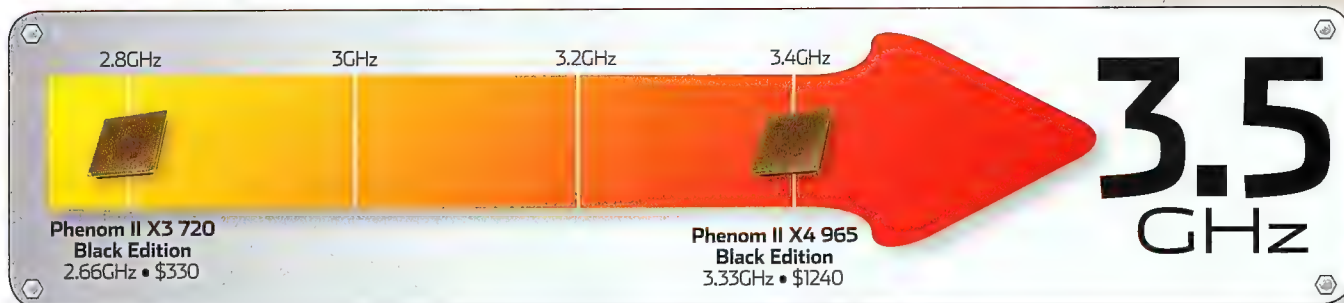


8 Once your PC has rebooted, it's worth running CPU-Z again to make sure your overclock has been applied – the QPI should read 190MHz now, for example, and not 133MHz. Note how the CPU frequency has been boosted from Intel's conservative 2.66GHz up to 3.8GHz after just a few minutes work in the BIOS.



9 An unstable overclocked PC is worse than a stock-speed stable PC, so before proceeding, you should check the stability of your overclock. To do this, run the smallfitt test of Prime95 again while checking CPU temperatures with CoreTemp. You should see no errors from Prime95, and a CPU temperature below 80°C.

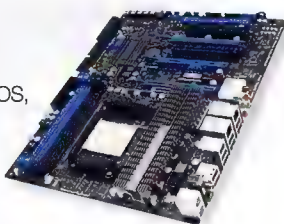
AMD PHENOM II X3 720



What you need

Socket AM3 motherboard

Typically, a good overclocking motherboard will have a user-friendly and comprehensive BIOS, plus good cooling for all its components. Reading our reviews is a good way to find out how each motherboard overclocks. For our testing, we used an MSI 790FX-GD70.

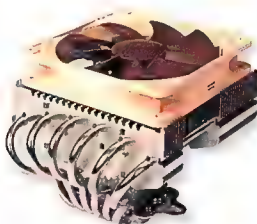


Dual-channel DDR3 RAM

The overall frequency of the CPU and the memory is linked, so to push the maximum out of your CPU, you need high-frequency memory. A kit that can manage 1,333MHz is fine, but a 1,600MHz kit will be easier for overclocking. We used 4GB of Corsair XMS3 1,600MHz memory.

Socket AM3 cooler

You need to keep an overclocked processor cool, and the reference cooler isn't up to the job. Good coolers tend to be large, and also have the benefit of typically being quieter than the one with the Intel sticker. For our overclocking, we used the Noctua NH-C12P.



The Theory of Overclocking

AMD didn't set out to make Phenom II X3 720 Black Editions; instead, it produced a batch of quad-core Phenom II X4 CPUs, some of which ended up as quad-core X4s and others as triple-core X3s. This is because no man-made thing is perfect; some CPUs will have a defective core that can be permanently shut down, leaving three perfectly reliable ones active. As all the CPUs are made from same materials in the same factory, the art of overclocking is tricking those slower, cheaper CPUs into thinking that they're really their faster, more expensive siblings. The Phenom II X3 720 BE has a frequency of 2.8GHz, which is a result of its 14x multiplier and 200MHz HTT (14 x 200MHz = 2.8GHz). As it's a Black Edition, both the multiplier and HTT are unlocked, so you can play with both to achieve your overclock. It's preferable to increase the HTT before the multiplier when overclocking a Phenom II X3 or X4, as this allows more data per second to flow to and from the CPU (you're increasing the 'bandwidth').

However, the HTT is linked to some other components, so as you increase the HTT, you may force other parts of your system to run beyond their capabilities. The guide opposite will walk you through all of these, and will tell you what to look for. As overclocking forces the CPU to run faster than usual (we're aiming for 3.5GHz rather than 2.8GHz), the CPU will have less time to register a pulse of electricity as a 1 value rather than a 0 (it will have 1/3,800,000 of a second rather than 1/2,666,666).

3D - 14% Faster, \$100 cheaper

Crysis (DX10, "High")



Applications - 2% Slower but \$100 cheaper

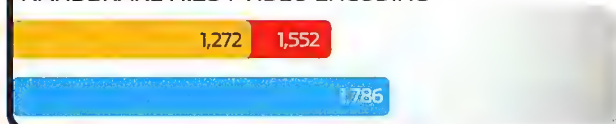
GIMP IMAGE EDITING



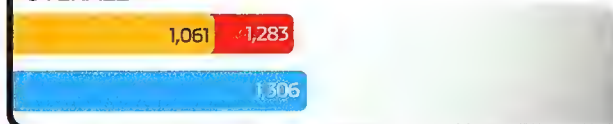
MULTI-TASKING



HANDBRAKE H.264 VIDEO ENCODING



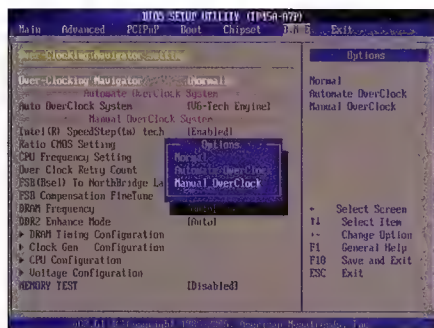
OVERALL



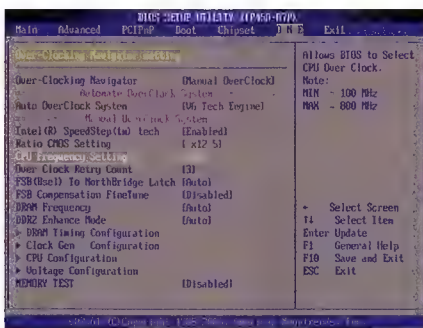
■ Phenom II X3 720 BE standard/overclocked ■ Phenom II X4 965 BE standard

Reference PC (Core 2 Duo @2.66GHz, 2GB 1066MHz DDR2 RAM, 250GB HDD, Asus P5K Deluxe) = 1,000

This step-by-step guide explains which BIOS settings you'll need to change in order to overclock your 2.8GHz Phenom II X3 720 Black Edition to 3.5GHz using the MSI 790FX-GD70 motherboard.



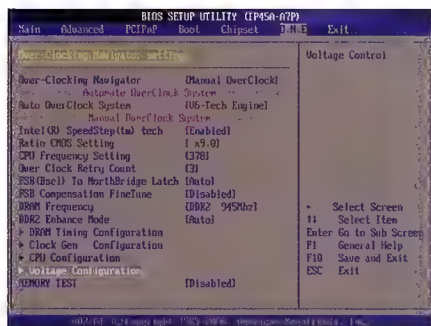
1 The first step is to find the Cell Menu in the BIOS, which houses all the overclocking settings for our motherboard. Find the setting called 'Adjust CPU FSB Frequency (MHz)' and enter '240' - you can use your keyboard or the menu to do this.



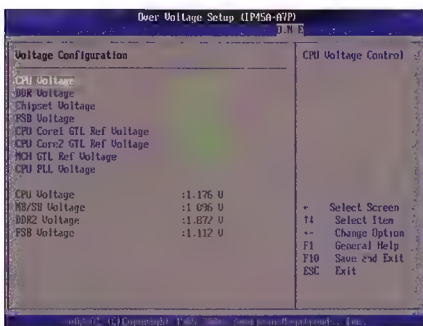
2 Next, we needed to increase the processor's multiplier from 14x to 14.5x via the 'Adjust CPU Ratio' setting - this will let us achieve our 3.5GHz overclock ($14.5 \times 240\text{MHz} = 3.48\text{GHz}$) without placing all the strain on the motherboard.



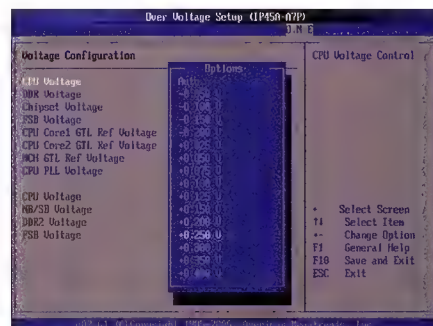
3 Increasing the HTT (which MSI mislabelled 'FSB' in Step 1) also increases the speed of the memory controller of the CPU (labelled 'CPU-NB Ratio' in the MSI's BIOS). It doesn't like running beyond 2,600MHz, but we were happy to leave the setting on Auto for an everyday 2,400MHz frequency.



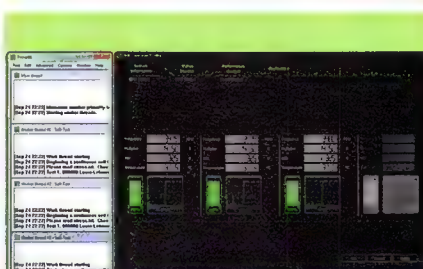
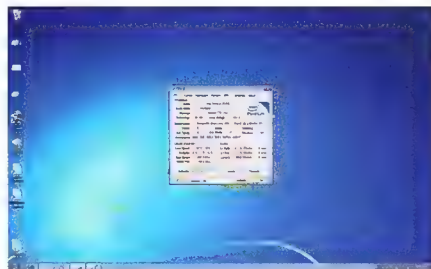
4 We now needed to check that the memory was set to run within tolerance via the 'FSB/DRAM Ratio' setting. As we used an HTT of 240MHz, we could use the 1:3.33 ratio (aka 'strap') to make our memory run at its maximum 1,600MHz - if we'd used an HTT of 242MHz (for an overclock of 3.51GHz), we'd then have to use the 1:2.66 ratio and clock our memory at 1,290MHz.



5 The final component that the HTT clock is linked to is the HT Link. This is the link between the CPU and the rest of the system (your graphics cards, other expansion cards, hard disk and so on). Like the memory controller in Step 3, the HT Link shouldn't be set over 2,600MHz, but again, we settled on the Auto setting for a 2,400MHz to err on the side of caution.

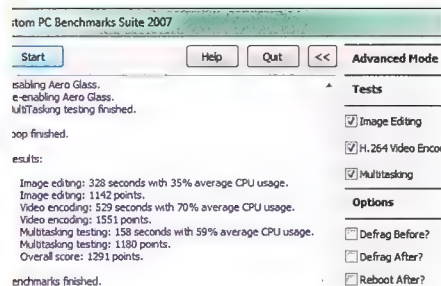


6 We only need to look at increasing two voltages. We set the intuitively titled 'CPU Voltage' setting to 1.405V, as adding too much extra voltage to a Phenom II CPU makes it very hot and, consequently, your PC becomes very loud. The 'DRAM Voltage' setting governs the memory voltage - our memory required 1.8V. However, check the modules themselves, their packaging or the manufacturer's website to tell how much you should apply.



7 Your last job is to set 'Spread Spectrum' to Disabled. After that, hit F10 (to save and exit), and then Enter. You can check that your overclock has been successfully applied by reading the retro white text as your PC starts - this is the POST (Power On Self Test) screen.

8 If you missed the POST screen, you can check that the overclock has been applied via CPU-Z or AMD's handy OverDrive tool - note that the frequency is now shown as 3.48GHz. OverDrive also has a reliable temperature readout, which we used when stress-testing our overclock with the smallfft test of Prime95.



9 After a few hours of Prime5 stress testing, you should see no errors from it, and CPU temperatures of no greater than 80°C, even with a bad cooler. Our Noctua held the CPU at well under 50°C, for example. Now run our Media Benchmarks to see how much faster your overclock has made your PC.



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HARDWARE

NEWS, REVIEWS AND ROUNDPUPS ON THE LATEST HARDWARE

This month, we sent Justin off to Vegas to cover the biggest electronics trade show on the planet, CES. As a result, you get to see all the coolest happenings direct from the show floor, and even a special look into how NVIDIA works! If that isn't enough (and if it is you can probably just stop reading here), we've also taken a look at Intel's first 32nm processor.

It's a strange one compared to previous processors, since this one can handle video as well. Intriguing? You bet! From there we've got our usual swathe of hardware, capping it all off with a look at some of the cheapest motherboards that you can buy for Core i5 processors, saving you some money and preventing a headache. Ain't that nice.

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HOW WE TEST

We do a lot of testing in our labs, and we look long and hard at every piece of hardware to determine whether or not it passes muster. From taking a new card out of its packaging, to bundled extras, to performance, every facet of a given piece of kit's 'user experience' is under scrutiny.

In some instances, we have tough benchmarks to help us rate gear. For a CPU or a graphics card, raw performance is of course the most vital stat as whether it stinks or smells like roses, as well as the ability to overclock well. But there are other things we pay attention to in the review process.

Value for money is an important consideration, especially during the current financial climate. High end gear is expensive enough as it is, so we also look for good bundles. For instance, a graphics card that comes with a game or two, all the cabling you'll need, and little surprises like tools and other bumpf will score higher than a card that costs similar, but doesn't give you any presents.

Build quality is another thing we rate. From a PC case to a motherboard, we like our hardware well-made and capable of a taking a bit of punishment. We also like any included manuals to be clear and concise.

A lot of what we look for can be hard to put into numbers, we admit, but we try to think about what any enthusiast would think about their new gear after laying down money for it, installing it, and then using it.

And our benchmarks help, too. We've picked a suite of games and applications that anyone can get access too, so that you – the reader – can easily compare your own gear with the kit we have in each issue. In fact, we'd recommend to all our readers that they run all of these tests on their systems and save the results, so you can always have a familiar benchmark of your own to compare to the latest gear in Atomic each issue.

HOT AWARD WINNERS!

ISSUE 110

Just some of this month's HOT AWARDS...

CYBER SNIPA SILENCER

"Simply matchless comfort and ergonomic design."

91/100

MASS EFFECT 2

"If ever a western game deserved the often sniggered at title of 'interactive entertainment', it's Mass Effect 2"

99/100



Our test LAN: NRG systems with Phenom 9850 CPU, 4GB of DDR2 RAM and a 4870X2 graphics card. The mainstay of our games testing.

CPU Benchmarks:

Hexus PiFast

<http://pifast.hexus.net/pifast.php>

PiFast is a program that essentially calculates pi to a set amount of decimal places. It is a single-threaded application (one core/thread) and we run it at ten million places (10, 000, 000) using the Chudnovsky method, in the standard mode with no compression, and a FFT length of 1024kb. The program is free, so feel free to run it on your CPU and compare. Memory bandwidth plays a significant role in the final performance of this program, so be sure you bump up the frequency as well as the CPU clock!

wPrime

<http://www.wprime.net/>

"wPrime uses a recursive call of Newton's method for estimating functions", says the website as it attempts to explain in plain English what it does. What it does is, essentially, complex square rooting and other number functions, which are able to be split up evenly between multiple cores, or simply run on a single core. We use wPrime 32M in both single and multi-threaded. The results of the single run are divided by the results of the multi run, and this gives us the efficiency of the CPU being tested – very useful knowledge to have when comparing chips and evaluating the benefits of overclocking.

Cinebench R10 x64

http://www.maxon.net/pages/download/cinebench_e.html

Cinebench is a stalwart benchmark, and is one of the more entertaining ones to watch. It focuses on rendering an image at 800 x 600 resolution, complete with ray-traced light effects and much more. This is able to be run in either singlethreaded or multithreaded mode, and efficiency is calculated exactly the same way as for wPrime. Simply download the .zip file, extract, and run! The program also supports up to 16 threads in total, and even eight threads with Nehalem is an impressive sight to see. The difference in performance between 32- and 64-bit is minimal – just keep that in mind if your results for the same setup are slightly different.

Everest Ultimate Edition

<http://www.lavalys.com/>

Everest is a system information tool that monitors voltage, temperature, as well as reporting on a massive list of other areas of your system. Hardware and software are noted here, but perhaps the most useful part of this program is the memory benchmarks. Ready for the fastest of dual/tri-channel memory, this tests the read and write bandwidth as well as latency. The program is a small download, but keep in mind that you only get a thirty day trial until you purchase the full version – something recommended if you're into getting the most info about what your tech is up to.

GPU Benchmarks:

Crysis

<http://www.ea.com/crysis/>

Crysis is one of those games that can scale from Average Joe's rig all the way to the beastly Dream PC in Kitlog; but due to recent graphics card releases we needed to bump it up a notch. Our testing now uses a standardised timedemo run, with all settings on high at a resolution of 2560 x 1600. While we can't run any antialiasing at this res and still get playable framerates on most cards, it's still more than enough to really give cards the workout they truly deserve.

Race Driver: GRID

<http://www.racedrivergrid.com/>

GRID, as some racing aficionados will know, is one of the most fun games of its genre to come about for quite some time, giving an accurate damage model along with realistic handling and a great visual style. Not only that but it is also very scalable over multiple GPUs, and is also capable of running on lower-end gear. We chuck all the settings to High, with 8 x MSAA at 2560 x 1600 for this test, using FRAPS to monitor the frames per second as we tear around the track for a single lap in our car of choice – the Nissan 350Z.

3DMark 2006

<http://www.futuremark.com/benchmarks/3dmark06/introduction/>

Designed as a benchmark for DirectX9 based systems, 3DMark 2006 (or 3DMark06) has been a staple of the enthusiast diet for many years. With four graphical tests, and two CPU tests, these combine to give a final overall score that allows direct numerical comparison to any other system in the world and, best of all, it's completely free. Just head to the URL above, and download your copy to compare to any of the reviews in the mag. All of the tests are run at stock settings, so just install, run, and compare – it couldn't be easier!

3DMark Vantage (2008)

<http://www.futuremark.com/3dmarkvantage/>

As the first extremely convenient benchmark program around for DirectX 10, 3DMark Vantage is a new contender in the benching scene – and is proving very popular. While you can download and run it for free, this is only once, requiring a small fee to register your copy (though the bragging rights for showing off your rig may be worth it). Some graphics cards will even give you a copy! We run this at stock settings, which is the most appropriate for comparison between our results and yours. This is also significantly better at multi-gpu performance scaling efficiency.

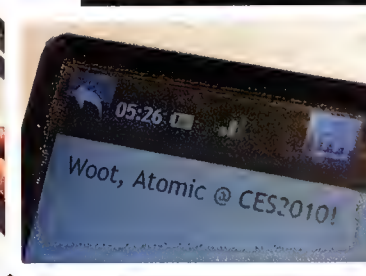


CES 2010

Justin Robinson travels halfway around the world for the biggest tech show on earth.

The Consumer Electronics Show, otherwise known as CES, stands as the largest gathering of tech companies in the entire world – eclipsing Computex by leaps and bounds with an attendance of 120,000 people. It does this quite easily thanks to a very wide focus; instead of showcasing specifically computer-related hardware, everything from dishwashers to cars are shown off with a certain American flair that ensures it'll be big, loud and attention-grabbing. It's no wonder why the show is held in Vegas! Naturally, when NVIDIA asked if we'd like to attend the show I leapt at the opportunity, and they flew me across the globe. Without them, none of the neat content on the site or the mag would be here in front of your (very privileged) eyeballs!

The first day at CES started with a bang as NVIDIA CEO Jen-Hsun Huang kicked off an announcement for the future direction of the company, steering slightly away from a heavy graphical focus and moving towards mobile computing with news of their Tegra-powered tablet PC concept. Essentially a dual-core ARM9 CPU with built in audio and an 8-core NVIDIA GPU, the Tegra chip has more power than your average netbook but



All the niftiest ASUS gear at the show, including four-way crossfire (top), and the Eee Keyboard (left). Coolest arm-phone ever? We think so!

Las Vegas, also known as Sin City, is best known for decadent casinos like Caesars Palace (below) and New York New York (right). Yes, that is a rollercoaster.



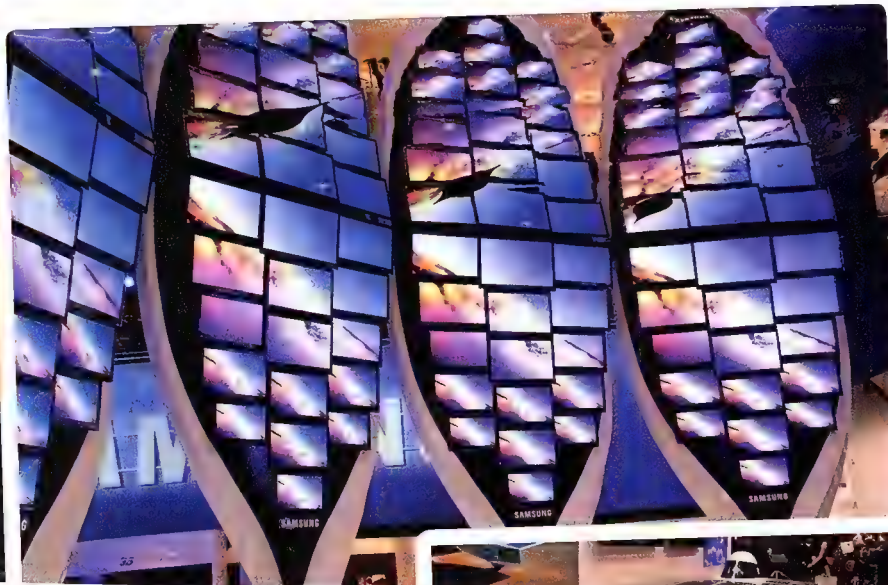
Nothing like an electric-powered car that can do 0-100km/h in 3.2 seconds. The AC converter is cooled by off-the-shelf watercooling parts!



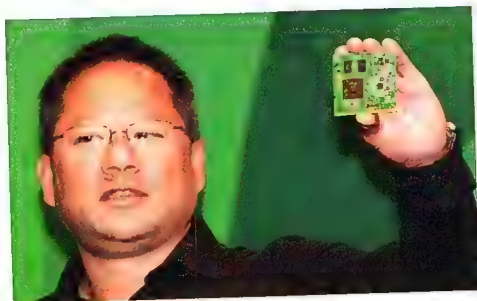
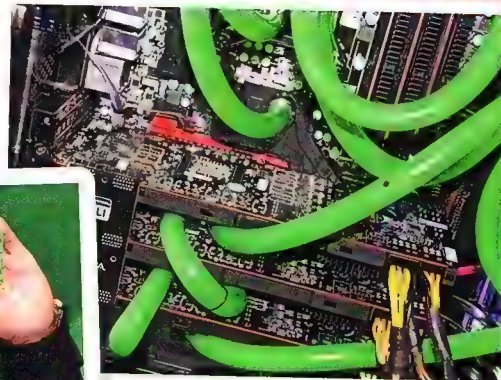
consumes a tiny 500 milliwatts of electricity. Being manufactured on a tiny 40nm process does help keep this low, but it generates so little heat that it doesn't even require a heatsink to run stably – very impressive. Not only will this new chip be packed into devices from over 50 different manufacturers already signed up, but it'll also be thrown into the latest R8 design from car manufacturer Audi to form the baseplate of the entire entertainment system. While news of Tegra was exciting, 3D VISION news was also abundant, and new drivers allow the tech to be used over three monitors in an ultra-widescreen setup very similar to AMD's Eyefinity technology – but with an extra dimension thrown in for good measure.

From there I wandered across the show floor towards the ASUS booth, a large display of every new or current piece of tech that the A-team had bubbling away in their gigantic think tank. Wading through rows of notebooks and netbooks to reach the interesting tech, my eye was distracted by a very funky looking piece of kit. Called the Eee Keyboard and eponymously styled, ASUS engineers have packed one of their netbooks beneath a practically full-sized keyboard and threw a screen in for good measure. While it proved a little awkward to navigate through the proportionately tiny screen it definitely was a neat idea, and HTPC duties are definitely one possibility. Wandering past the Eee took me to a display of future

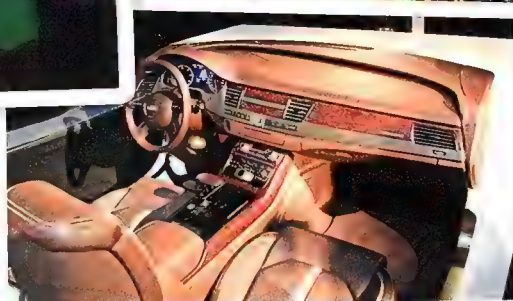




It wouldn't be CES without robots, Samsung's gigantic wall of televisions, or Sharp's solar-powered Tokai Challenger. Just to the right is NVIDIA's newest Fermi GPU, running in 3-way SLI. Delicious.



Jen-Hsun Huang holds the Tegra chip (above), while Audi show off their new R8 design. A befanged Enterprise was on display, and Casio's balloon-popping models abounded.



computing concepts, covering LCD displays that weren't in the traditional rectangle shape, motorised TV screens complete with Stargate-like iris shutters that hide the display when not in use, thin touchscreen devices that seemed designed to merely complement a full-sized computer by displaying information remotely (and allowing basic interaction). However, the coolest piece on display was the flexible wristwatch that doubled as a phone, allowing calls as well as other computing tasks on the go. These technologies are many years away from actually being released, if indeed they ever are, but they're still a great sign that there's still a lot of creativity out there.

The second day at CES brought a visit to Microsoft's massive stand, one of the most opulent and luxurious stands at the show. Packed to the hilt with everything even slightly Microsoft related meant a huge amount of stuff to see, from demonstrations of their Surface computer designs to in-car voice activation systems. The Bing search engine was pimped harder than religion at an atheism convention, while the already popular Xbox 360 console displayed some of the most awaited games this side of an E3 including Mass Effect 2 (now released) and Splinter Cell Conviction. Intel's stand was next, and while it wasn't quite as huge, it certainly had a lot in store. Most exciting was a gigantic touch-enabled screen that displayed live content harvested from popular websites such as Twitter or Flickr, whacking that content onto a 3-dimensional rotating cube and placing it into a sea of information. A simple poke is all that's needed to download the full picture or info, and the cubes meander around the screen in a lazy, relaxed way. The entire





3D camera tech was pimped (top left), while Marvel's Stan Lee made an appearance to sign posters. iPhone-controlled hovering drones, MSI models showing off notebooks, Hydra-powered motherboards and LG's OLED screens are only a sliver of what was on offer.

app was powered by a single 32nm Westmere chip, though whether there was a graphical adapter present was glossed over. Officially launched was the new range of 2010 processors covering the Core i3, i5 and i7 models, as well as some new low-powered Atom models.

The sun rose upon the third day with a decidedly green tint, and I attended an all-day razor-sharp look at NVIDIA's newest graphics architecture. Codenamed GF100, and referenced to internally as Fermi, their new design hasn't had confirmed clockspeed information released, but the look into the architecture back in Issue 107 is still accurate as the design hasn't changed. I got to see a performance comparison between Fermi and another rig running a GTX285; the performance I saw was roughly 30-40% faster in general. These numbers are pretty solid, and when Fermi hits stores



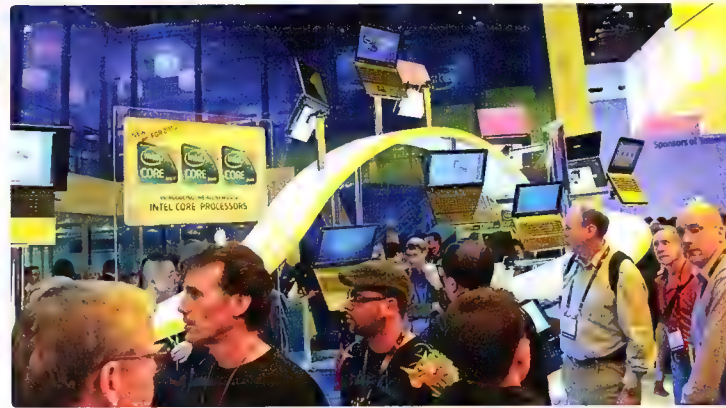
sometime in late Q1 it'll be exciting to see how much it costs.

Day four brought about a trip to MSI's stand, with a surprise showing of their Big Bang Fuzion motherboard that comes stock-standard with the Lucid Hydra 100 chip. The Hydra is an onboard solution that hooks directly into the PCIe lanes as a middleman, divvying up the workloads at a system driver level to give each present GPU a fair share of the load – but amazingly this chip isn't vendor-specific, and can even run ATI and NVIDIA cards at the same time! Not even a bridge is needed to have the cards communicate, though how performance is affected remains to be seen. The chip itself is co-funded in part by Intel, a relatively smart move for them that may potentially remove some of the licence costs for chipsets.

With the show coming to a close and the time quickly arriving to travel home once again, there was still plenty more of what the show offered – but there's never enough time to see it all. Make sure you check out all the stuff that Atomic got up to at CES 2010 on the website (<http://www.atomicmpc.com.au/Topic/164252.ces-2010.aspx>), as we stride confidently into a new year's worth of tech. Bring it on.



Microsoft's car section (above) and Surface table (above right) were fascinating, Intel's abstract Core notebook wave drew attention.





Justin Robinson dives deep under the skin of NVIDIA's newest chip.

We've heard about NVIDIA's GF100 chip quite a lot over the past few months, and while the details were flowing quite freely for some time they haven't quite come thick and fast for months. Now we can finally reveal a few exciting things about the new architecture, but there is still a lot we don't know about the GF100 that only a review can fulfil. However, during CES this year we had a chance to sit down with some seriously smart dudes at NVIDIA – and what they had to say might surprise you.

So when will GF100 actually be here?

As you'll already know, ATI hit the market hard and fast with their 5xxx series cards that launched late last year, and that's something that NVIDIA regret. We spoke with Drew Henry, the General Manager of NVIDIA's Desktop GPU Business, and he regretfully mused "Boy, do we wish that we were shipping this when Windows 7 launched". Of course this would have been impossible to reach with any significant volume, and at time of writing the design of the GF100 hasn't even been completed. Drew explained why the boards we saw at the show weren't available for testing, "We will not be discussing final clocks, or what the final board design is; you'll see prototypes of the board, but it's not our final design". Clearly there's still a lot of work to be put into the GF100 to nut out any problems, but what we did see was a working core with performance that was a definite improvement over previous generations. Even though it's not quite out, we did get an assurance that "[we'll] have it in the marketplace in this quarter", potentially giving us the chip as early as February.

Building a better graphics card

Modern GPUs are both fascinating and frustrating, with a level of complexity that make most other problems look easy, and the GF100 is no different. With over three billion transistors manufactured on a 40nm process, there's a lot here to go wrong – but knowing where

to even start improving on older generations can be a daunting task. Thankfully for NVIDIA, Architects like Jonah Albin have the tools to get things going. He begins a new generation quite simply, "we step back and gain a perspective on where gaming is going", taking cues from current games as well as what developers have in the pipeline. One of the largest challenges that Jonah and other architects have faced is



NVIDIA's GF100 core layout.

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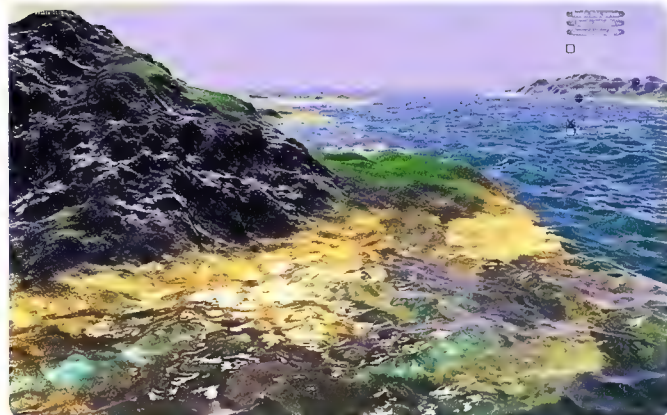
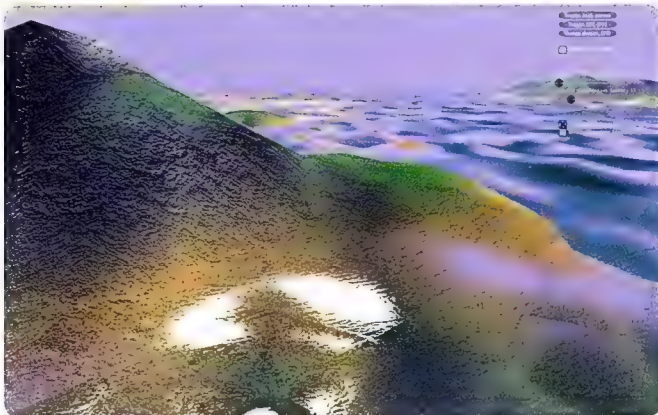
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Games for Windows **LIVE**

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Tessellation in action within a tech demo, showing how the basic model (left) can be enhanced easily. Note the amount of detail in the terrain – even the water looks better!

knowing where to focus the improvements to the core; additional changes to areas that won't be used simply wastes silicon and money, while not changing enough will result in a deficient (and slower) product.

Where the architects usually find their ideas is in the cinema. "Looking at film is often the inspiration for what we do with a new generation", he explains, "pixels are very beautiful these days, but the geometry side has not made very much progress at all". The difference between the two is that while pixel detail, provided through pixel shaders, does provide realistic effects such as lighting, it doesn't provide the depth to an image that geometry shading can achieve. This problem hasn't been tackled for many generations – in

fact, there's been a 150x increase in pixel shader performance since the introduction of DirectX 9, but geometry shaders have barely increased by 3x. However large the gap between the two kinds of shaders is, there really wasn't much of a point when considering increasing the geometry shading performance. That is, until DirectX 11 launched.

DirectX 11, Tessellation and more

The reworking of DirectX 10 into DirectX 11 brought around what is essentially a new version of the popular API used in game development, and one of the features that is most exciting is tessellation. Tessellation is based around the

idea of taking a coarse representation of an object or model, and creating a lot of geometric data about that object without giving the coder of the game a larger workload. To do this, the model is first diced up into thousands upon thousands of triangles, and the extra detail gives a better representation of the object. Until the API change to DirectX11 had happened, Jonah explains that "it would be totally impractical to have all that data sitting around", which is why the GF100 completes all its tessellation on-die. Even more useful about tessellation is that once it is completed, a displacement map can be applied to the high-detail model to give it further depth as shown in the "Imp" example. Tessellation can be dialed up or down on the fly, increasing detail or decreasing it as the game



Audi's R8 car, raytraced in realtime on a GF100.



The sparks created by the Magnatar are actual objects, bouncing around the level until they dissipate.

developer sees fit. In some cases, the amount of detail in a model can improve by a factor of 8000:1 – now that's a lot.

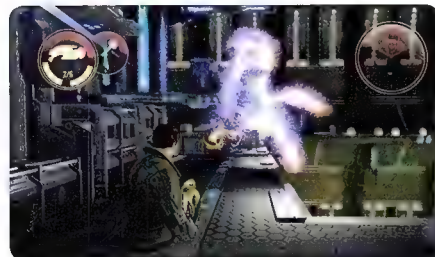
The GF100 architecture has been completely designed from the ground up to provide a high amount of performance with tessellation. While we've already looked at the architecture to some depth, there are a total of 512 processing cores that are split up into sixteen groups, called Streaming Multiprocessors. Within each SM are 32 processing cores, some L1 cache for workloads, but most importantly each SM also has its own dedicated Polymorph Engine. The Polymorph Engine is a dedicated tessellation unit, capable of taking direct control over the function and increasing performance markedly. While ATI simply added tessellation into their RV870 core from the RV770 and met the DirectX 11 specification, NVIDIA's implementation is technically much faster. "If we had done the same [as ATI] with GT200 we would've gotten similar results", Jonah explains.

PhysX surges onwards

Part of the design mentality behind the GF100 chip has also been applied to increasing the performance in PhysX titles. While NVIDIA purchased Ageia and their PhysX library almost

two years ago, we've seen a huge amount of games support this feature for every platform under the sun, including the Xbox 360, PS3 and Wii. If you've ever played a game on PC and noticed a "The Way It's Meant To Be Played" logo on it (henceforth referred to as the tongue-twisting TWIMTBP), it's not because money has exchanged hands, but simply that NVIDIA have lent their expertise and time to the developer.

Of course, NVIDIA do receive the benefit of their logo being spread around and PhysX being incorporated into a game, but they are a company and like any other, the bottom line is what counts. As a result of the TWIMTBP program however, developers of games such as Dark Void have been able to create fancy new weapons and effects. The swirling torrent of particles that bursts out of an enemy soldier's corpse, bouncing off the environment and spraying over their comrades, is an effect that has been applied to the Disintegrator gun as a direct result of that help. While you do need a PhysX-capable card to see the effect, it's truly breathtaking, and the Magnatar lightning gun is no slouch either. The TWIMTBP benefits aren't restricted to NVIDIA-only improvements either; ATI performance has increased in some situations even more than the green team has.



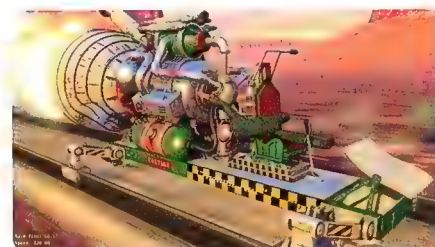
The Disintegrator gun from Dark Void packs a powerful punch!

Developer tools + Ray tracing = win

Not content with simply helping out with the coding of games, NVIDIA created a toolset called Nexus that incorporates CPU programming as well as GPU programming. This allows developers to not only create their code, but they can also run it in real-time on a remote host and debug graphical errors right in front of their eyeballs, and fix problems even faster than before. With game release schedules seemingly down to the thinnest of wires, this is sure to help us get better games, faster. On top of that is Ray Tracing performance – it's increased a whopping three times over the previous generation. However, that still means it runs at only 0.6fps, but we're that much closer.

The GF100 is shaping up to be NVIDIA's biggest gamble yet, but if benchmarks shown to press at CES are any indication, we can expect a roughly 40 per cent performance increase – if not more – in games. The cards will be out later this year, but irrespective of when, we can definitely say one thing for sure.

The future can't arrive soon enough.



The Supersonic Sled demo, one of many showing off PhysX.



The Imp shows the four stages of modelling, from basic tessellation all the way to displacement mapping.

GIGABYTE H55M-UD2H

P to the H, add an A and a T. Werd.

Street Price \$130 Supplier GIGABYTE

Website www.gigabyte.com.au

Specifications Socket LGA1156; Intel H55 chipset; mATX form factor; 2x PCIe x16; 2x PCI; 5x SATA; EIDE; DDR3-1600

The latest Intel motherboard platform has well and truly launched with new boards hitting shelves as fast as your eyeballs glide over this page, bringing into focus the new H55 and H57 Express chipsets. There's not much to set the two apart, except for an extra two PCIe 1x lanes and support for Intel's Rapid Storage Technology (offering RAID and Native Command Queuing support), but thanks to the budget skew of the H55M-UD2H it's using the cheaper option.

The H55 Express is manufactured on a 45nm process, and is similar in pretty much every way to the current P55 Express chipset. A DMI link remains between the LGA1156 socket to communicate with the rest of the system, there's six SATA 2.0 ports built-in, 12 USB 2.0 ports, and Gigabit Ethernet support. An added Flexible Display Interface (or FDI) is used to take the two display outputs from the new Intel 32nm chips and pipe them out of the socket, which is the major improvement and change here. The H55 is mainly used as an interface hub for storage and other components, and is similar to the Southbridge on older platforms.

This chipset's influence can be seen in the IO panel of the board, where there are only six USB, PS/2, Firewire, hybrid eSATA/USB, Gigabit Ethernet and 7.1 channel audio – making room for DVI, VGA, HDMI and DisplayPort connectors. While again only two of these can be used at any one time, they're perfect for media duties. This motherboard seems one of the very few that has escaped GIGABYTE's crazy refresh, and doesn't have USB or SATA 3.0 due to expense.

Though this board is built as mATX it doesn't really feel cramped at all, with a digital PWM giving a surprising amount of room around the



LGA1156 socket. Heatsinks aren't used to help in cooling them, but they didn't appear to need it. A single 4-pin power connector sits against the top edge of the board for CPU power, which should be plenty even when overclocking. The remaining components on the mobo are powered by a standard 24-pin ATX connector.

Two DDR3 slots lie pretty close to the LGA1156 socket, providing two channels that run at a stock maximum of 1333MHz. This can be increased manually with overclocking, but can also be used with XMP-capable kits of memory. As shown with the Everest memory tests in the table, bandwidth here isn't amazing – it's barely faster than the P45 platform, in both latency and read/write speeds. However, it's not bad for a H55 board.

Storage options sit next to the memory slots, providing IDE, Floppy and five vertical SATA ports. The sixth port available to the chipset

has been rerouted to the IO panel, providing an eSATA port. Standard front panel headers lie in the bottom-right corner of the mobo, as well as more USB headers. In usual GIGABYTE style the audio header lies just behind the IO panel, which is an annoying-to-cable spot that is unlikely to be changed. A small heatsink covers the H55 chipset, but it became very hot under use, and needs direct airflow if it's to remain stable long-term.

Overclocking went pretty well, with the BIOS in a mature form and every setting categorised for a very accessible layout. We hit a maximum speed of 4425MHz, which is pretty fast, scoring 13476 in Cinebench Multi. This board is a great bargain for all you're getting with it, and it's not a bad 'clocker either. **JR**

GIGABYTE H55M-UD2H

	15.661	133x25; DDR3-1333 7-7-7-21	150x25; DDR3-1500 7-7-7-21	175x25; DDR3-1400 7-7-7-21
PiFast		25.46s	23.35s	20.55s
wPrime 32M – single thread		35.957s	32.931s	28.222
wPrime 32M – multi-thread		13.896s (4.67x efficiency)	12.292s (5.25x)	10.577s (5.21x)
CineBench R10 64-bit – single thread		4576	5370	6259
CineBench R10 64-bit – multi-thread		10981 (2.40x efficiency)	12156 (2.26x)	14349 (2.29x)
Everest Read		9569MB/s	10661MB/s	9118MB/s
Everest Write		7499MB/s	8285MB/s	7684MB/s
Everest Latency		77.0ns	71.2ns	73.7ns

Performance

Pretty nifty overclocker, fast at stock speeds.

92

Value

Doesn't have anything 3.0, but sure is cheap.

85

Features

Nothing special.

60

Build

Toasty, small and otherwise fine.

70

Overall

Doesn't offer much in the way of features, but it's not a terrible board.

82%



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Intel Core i5 661

Intel's first 32nm processor with built-in graphics.

Street Price \$285 Supplier Intel

Website www.intel.com

Specifications 3.33GHz dual core; 32nm manufacturing process; 'Clarkdale' core; 64KB L1, 256KB L2, 4048KB L3; 25x multiplier; 87W TDP; LGA1156; integrated Intel Graphics Media Accelerator HD.

Intel's research and development team has been burning a blazing path of progress for the past few years, bringing around revolutionary new designs and process shrinks as often as a germophobe washes their hands. The one thing about this launch, however, is that it's not immediately exciting for most Atomians – but we'll get to that in a minute. For now, this launch highlights a brand new design ethos for Intel's platforms in both the desktop and mobile spaces, and the effects of this change will echo throughout the marketplace for quite some time. For now though, let's start with the nuts and bolts.

Teeny-tiny architectures

The major change that the Core i5 661 brings to the table is a manufacturing process shrink from an already quite slim 45nm to a fantastically small 32nm. This is a powerful change in manufacturing that not only allows an increased number of cores produced per 300mm silicon wafer (the template from which the cores are carved), but also means that power consumption and other factors can be dropped at the same time. This technology is important to Intel; The company's planning to move the remaining Core processor family members over to it, and are doing so as quickly as possible.

Clarkdale itself is the codename for the 32nm core, a curiosity due to the reduced amount of logical processing cores contained within. Only two cores are physically available within a Clarkdale processor, though thanks to Intel's HyperThreading technology there's an effective four software threads that can be piped to the chip. There remains three hierarchical levels of cache on-die, with 64KB of superfast L1 cache that is backed up by 256KB of L2 cache; of



which both cores on die have an exclusive set. At the highest level of cache resides a rather large 4MB of L3 cache, providing a shared pool of memory that each of the two cores can fight over depending on workloads. Very similar to the Nehalem architecture – but Clarkdale comes with a twist.

Is it a CPU or GPU?

Buried underneath the silver heatspreader on top of the CPU is a special feature that no processor until today has contained; a fully functional graphics processing core, also known as GPU. Placed onto the same silicon package as the CPU core (the large rectangular board that is green in colour), this GPU is a 45nm version of Intel's Graphics Media Accelerator that is, amusingly, physically *larger* than the actual CPU! While it doesn't have specifications that will make anyone

drool (nor even salivate), it does boast twelve processing units within its DX10-compatible frame. Running at a stock 900MHz frequency gives this on-package GPU plenty of speed, and the i5 661 boasts the highest clocks of any in the Clarkdale family. There is no dedicated memory for the GPU, so it can 'borrow' 64-128MB of system memory for textures. Again while it is completely contained within the package, performance in 3DMark06 only returns 2072 – only enough for the most basic of games. It's technically overclockable via the BIOS, but this produced instabilities and other such errors, so it's best to leave it alone. Of course, it will deactivate once an expansion with video capabilities is installed. While the desktop version of the GPU will remain at a steady clockspeed (unless otherwise changed), the mobile version contained within the chip codenamed Arrandale will be able to alter the GPU clock depending on workloads, theoretically saving power and therefore a chunk of battery life.

Refresh my memory

Part of the new design ethos has been to move everything previously accomplished by the Northbridge on-die (or on-package), requiring only a southbridge chip in the form of the H55 and H57 chipsets. However, while the preceding Nehalem and Lynnfield designs incorporated a fast memory controller that sat directly next to processing cores on-die, Clarkdale strips this out and places it once

Intel Core i5 661

	133x25; DDR3-1333 7-7-21
PiFast	26.88
wPrime 32M – single thread	36.146s
wPrime 32M – multi-thread	13.852s (x efficiency)
CineBench R10 64-bit – single thread	4631
CineBench R10 64-bit – multi-thread	10570 (2.28x efficiency)
Everest Read	9331MB/s
Everest Write	7492MB/s
Everest Latency	84.7ns

again into the northbridge-esque GPU core – providing fast access to memory for the GPU alone. This is shown pretty clearly in memory latency tests, returning a horridly slow 84.7ns compared to an AMD DDR2-based platform's 57.3ns. While memory bandwidths aren't terrible they certainly don't take advantage of DDR3's higher theoretical capacity at all, instead returning numbers that had us swearing we had a system using older (cheaper) DDR2.

Cinebench multithreaded score is only 837 points in Intel's favour. While AMD's chip can't quite compare in single-threaded apps, for any serious multithreaded workload it's within spitting distance of Clarkdale performance at a price that comes in for far less – not even considering cheaper motherboards or memory.

...the mobile version contained within the chip codenamed Arrandale will be able to alter the GPU clock depending on workloads...

This limitation is simply another one that, in addition to only two physical processing CPU cores, detracts from the chip somewhat.

Where it counts

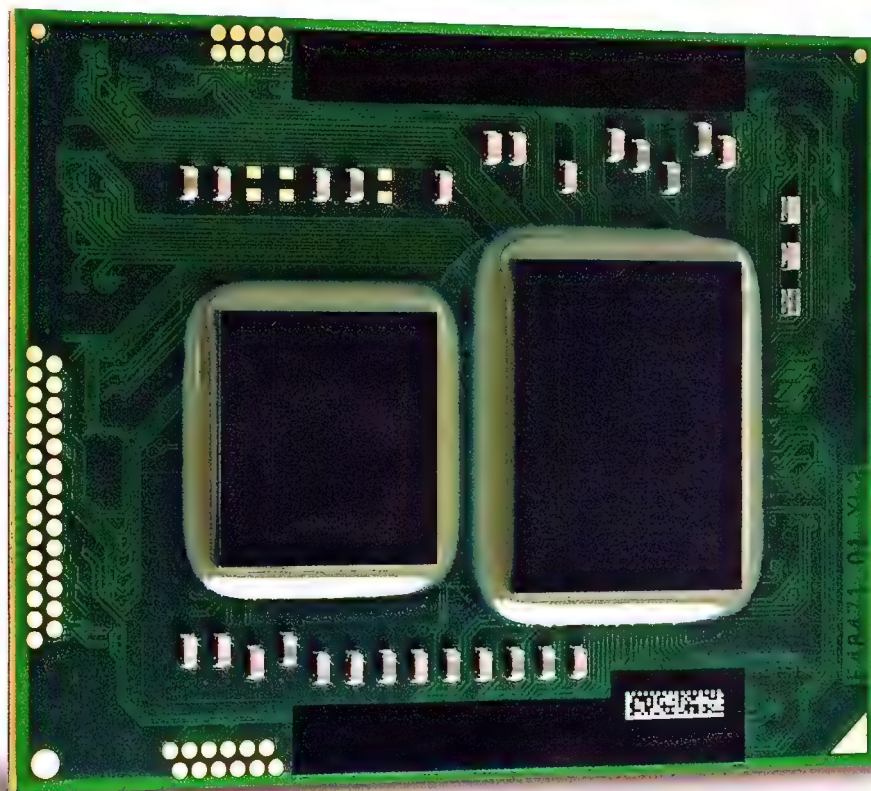
Performance is ultimately where most arguments about Clarkdale boil down to, but where the Core i5 661 is sitting there isn't too much that is tempting. PiFast scores are quite fast, and the remaining benchmarks are also respectable (especially considering that only two cores are present), but the price of \$285 must also be factored in. Compared to AMD's quadcore Athlon II X4 620 chip (page 36, Issue 107) at \$120, the i5 661 doesn't seem so great – especially considering that the

Where the Clarkdale chip comes into its own is overclocking, and even while using the included stock cooler we found that 4325MHz was possible with very basic tweaking of simple settings – barely touching the vCore at all. Temperatures weren't a concern at this speed, though the chip is rated at an 87W TDP maximum by Intel. Further overclocking is definitely possible (and is damn well guaranteed) with the addition of an aftermarket heatsink, pushing the chip well over the 4.6GHz mark.

Right for me?

The Core i5 661 is never going to be a chip for enthusiasts, nor even one practical for the business world due to sheer expense. However,

the lower-end Core i3 530 (that also slots into the Clarkdale family) is also based on the 32nm architecture with inbuilt GPU, and at \$175 it's a tempting choice for some overclocking fun or even a decent office PC. What this chip means most though is that Intel's next wave of enthusiast four and six cored processors will each boast higher overclockability and better performance – and in the end, we all win. Until then, we're off to fantasise about a certain Sandy Bridge... **JR**



XFX 5770

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Website www.xfx-force.com

Specifications 850MHz core; 1200MHz memory (4800 effective); RV870 'Juniper XT' core; 800 shader units; 1024MB GDDR5; 128-bit memory interface; dual slot PCB with active cooling; 6-pin PCIe power connector

Card info www.techpowerup.com/gpuz/hspre



15% OC



Without a graphics card (and most likely a good one at that), the advent and rise in popularity of 3D games would surely have never happened. Boasting powerful capabilities with specifically designed hardware features, these cards are the lifeblood of gaming – in computers as well as gaming consoles. While the loungeroom counterparts are running cut-down generations-old versions of the technology, however, we're treated to the exclusive ability to upgrade to the latest and greatest in the industry. At the top of that pile is ATI's 5xxx series; perhaps not always the fastest, but certainly one of the best options for the money.

This card from XFX is the 5770 model, based around the RV870 core that has been manufactured on a 40nm process (that aims to cut power consumption and heat while reducing costs). It boasts only half the total amount of shader units compared to the highest-end 5870 model at only 800, but these are running at a fast stock speed of 850MHz. Memory bandwidth is supplied at a decent clip with 1GB of GDDR5 chips that interface through a 128-bit memory bus. It's also fully DirectX11 compliant, with built-in tessellation as well as completely programmable shader units that give a greater amount of flexibility compared to previous generations of graphics hardware.

The manufacturing skill of ATI is shown off admirably here when the card was overclocked, allowing an extra 15 per cent clockspeed (980MHz) and a 27 per cent rise in memory clocks (1525MHz). This improvement was impressive, paying significant increases in both performance and bandwidth; though at a cost of hugely increased heat generation. So pronounced was the heat that we amicably touched the memory chips at the rear of the PCB, and promptly lost our fingerprints. Within a case with high airflow however, this shouldn't affect stability too much, and was more than stable enough to complete a run of 3DMark06.

Stock performance was nice, though it remains quite low compared to the 5850 due to missing shader units. 3DMark Vantage did see a performance level bump, and drivers have changed significantly in such a short space of time, so perhaps some more performance will be added in subsequent updates. It's more than enough power at stock to give you a

decently playable hi-res experience in GRID, but you'll have to turn down both resolution and settings to get Crysis running smoothly.

Physically the card is similar to the rest of the 5xxx series ilk, being encased in a black plastic shroud that encapsulates the heat and guides airflow brought in by the fan towards the rear of the case. In fact this cooler is just a reference model with an XFX sticker whacked on the top, showing a sort-of engine. The whole card uses a maximum of 108W of power at stock speeds, which means it needs an external 6-pin PCIe power connector, though at idle this drops to only 18W. This was shown by low temperatures of 40 degrees at idle, rising to 64 degrees under load – but kept in check by a fan that idled at 58dBA and peaked at 60.5dBA. Perhaps not the quietest fan ever, but it's as common as sauce on a meat pie.

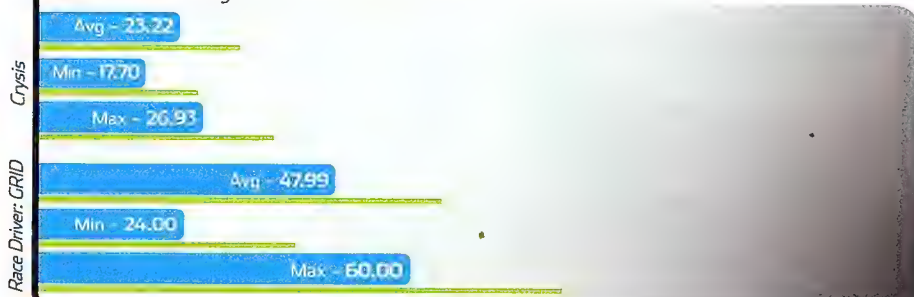
For a price just over \$200 this card is great value for money, and while it doesn't come with a game to sweeten the deal it remains a good choice for budget gaming. **JR**

XFX 5770 3d Mark scores



Score

XFX 5770 Gaming Benchmarks



= Reference scores: XFX 5850

Frames per second

Performance

Great overclocker, stock performance nice.

81

Bundle

Cables and drivers, but no game.

70

Value

Not the cheapest, but certainly not bad.

88

Build

Quite average, does the job.

85

Overall

A tempting value gaming card.

84%

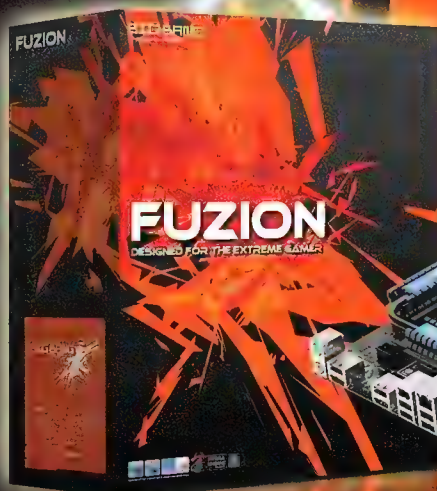
msi™



SUPPORTS THE ALL NEW 2010 INTEL® CORE™ PROCESSORS IN THE LGA1156 PACKAGE

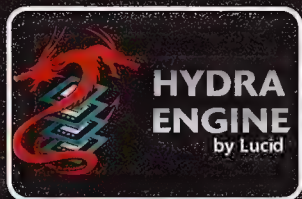


**HYDRA
ENGINE**
by Lucid



BIG BANG FUZION

MSI Big Bang Gaming Series. Through long-standing development and with much energy, MSI formed the state-of-the-art gaming line inspired by the mighty Big Bang. Unique and innovative, the all-new Big Bang series will deliver the shock and awe of unprecedented gaming experience and expand into its own collection of galaxies. This begins the new era of ultimate gaming machines.



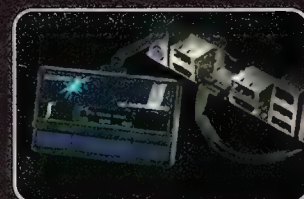
**Flexibility in Graphics
Performance**



**100% Server-grade
Hi-c Capacitor**



**Quantum Wave™ Audio
Card EAX® ADVANCED
HD™ 5.0**



External OC Dashboard

ALL.MSI.COM

Gainward GT240

A little card that just about can from Gainward.

Street Price \$120 Supplier Gainward
Website www.gainward.com

Specifications 585MHz core; 945MHz memory (1890MHz effective); 1424MHz shader; GT215 core; 96 stream processors; 1GB GDDR5; 128-bit memory interface; dual slot PCB with active cooling

Card info www.techpowerup.com/gpuz/8x3rp



The GT240 card was never meant for performance super-stardom, fitting into the amateur category as tightly as Mario fits into his form-fitting blue pants. Thankfully this offering is slightly more advanced than your average plumber's graphics card, and there are a few key things that keep Gainward's card flowing along nicely. Purring along underneath the sink of this card is a 40nm GT215 core that packs 96 stream processors, also offering a 128-bit memory interface for some decent bandwidth to the onboard GDDR5 memory chips, of which there are a total of eight.

First and foremost is an impressive memory boost from the now-very-average 512MB of reference memory, reaching a doubled amount of 1GB. There's also a mild factory overclock applied to the core and the memory to the tune of 35MHz and 45MHz respectively. The price of course attracts a premium of \$15 or so for this model, but the benefits of all this extra stuff are quite clear when looking at the card's performance – but we'll talk about that in a minute.

Ripping the card out of the box reveals a bright red PCB that should fit in pretty much every case, and it's a [i]shade[i] larger in length when compared to a 5670. There's no additional PCIe power connector needed here, as the core devours a meagre 69W of power – which is underneath the maximum slot

specification of 75W. Strangely there isn't a SLI nipple along the top of the card, however you'd be pretty mad to get one of these with thoughts of SLI down the track. In pretty much every case, buying a more powerful single card is the best upgrade.

Display outputs cover HDMI, DVI and VGA: not going to set anyone's world on fire, especially compared to ATI's triple digital connections. Still, it's a decent amount of flexibility, and with NVIDIA's recent announcement of 3D VISION over a triple-monitor setup (digital only) it's a nice sign that outputs are increasing. Again though, you'd be mad to want to run 3D VISION on a low-end card like this.

The heatsink used here couldn't be simpler, consisting of a lump of aluminium with extruded fins, and a decent fan whacked on top. There is a black plastic shroud around the front of the card, but rather than working to direct airflow any specific way it seems merely there to keep cables out of the fan. Annoyingly, the fan is connected via a 2-pin cable that prevents software control over the speed, and therefore noise, of the card. This didn't prove too distracting under use, remaining at 57.5dBA regardless of load, but is still a little restrictive.

Idle temperatures were quite surprisingly cool, sitting at 38 degrees, but this rocketed to 61 degrees at load – quite high for a GT240.

Overclocking performance didn't seem to suffer under these increased temperatures though, with a maximum clockspeed increase of sixteen per cent (679MHz) reached relatively easily. Memory speeds refused to increase at all, most likely due to the bare memory chips running at a blistering temperature under any kind of load. We're not talking blistering as in "ooh that's a little warm", but more like "where'd I leave the skin on my finger?!" Definitely make sure there's some airflow there!

Game performance was much better than reference versions of the card, with Crysis being playable on lower settings, and surprisingly even GRID managed to run. The extra memory headroom and clockspeed even gave a boost to both 3DMark programs to the tune of 3-500 points, and it's definitely worth spending the little bit extra. In all, this is a good card for those looking for budget gaming at higher resolutions, and it's overclockable to boot. **JR**

Gainward GT240 3d Mark scores

3DMark 06 – 11217

3DMark Vantage – P6065

Score

Gainward GT240 Gaming Benchmarks

Average – 10.75

Minimum – 2.36

Maximum – 13.08

Average – 13.76

Minimum – 9.00

Maximum – 18.00

= Reference scores: XFX 5850

Frames per second

Performance
Great overclocker, nice speed for a GT240.

73

Bundle
Only driver and manual included.

65

Value
Not too shabby.

87

Build
Decent, though hotter than the surface of the sun.

80

Overall
One of the best GT240s on the market.

76%

Sapphire 5670

ATI's latest card has got wood.

Street Price \$150 **Supplier** Sapphire
Website www.sapphiretech.com

Specifications 775MHz core; 1000MHz memory (4000 effective); RV870 'Redwood XT' core; 400 shader units; 1024MB GDDR5; 128-bit memory interface; dual slot PCB with active cooling

Card info www.techpowerup.com/gpuz/6w2zx



Graphics card manufacturers, such as Sapphire, have never designed the cores that run inside their products. Instead, this task is left up to the current two largest designers of processing cores; ATI and NVIDIA. ATI have been first out of the gate with DirectX11 cores, and their top-end design has brought a lot of performance improvements and architecture changes to the whole range of cards. Until now we've only seen the higher-end performance offerings, but the newest cores have finally trickled down to the mainstream market – shown here in the form of the 5670.

It's still based around the R870 core that debuted late last year, but the derivative here is codenamed Redwood. Sporting only 627 million transistors and 400 shader units (compared to 2.15 billion and 1600 units), this core is still manufactured on a 40nm process and is clearly aimed at those on a budget. While it retains all the DX11 features that are inherent in the design of the core, clock speeds move along at a reduced pace of 775MHz. Memory speeds are also affected by the nature of this cut-down core, with a speed of 1000MHz matching a 128-bit memory bus. There's a very workable total of 1GB GDDR5 memory here to play with, which should be plenty for any game.

Most noticeable about the card's form factor is the limited length of the card, coming in at

only slightly longer than the PCIe slot that it resides in. This is due in part to the low power consumption of the card at load hitting a 61W ceiling; below the 75W maximum that can be drawn through the PCIe slot. Therefore there isn't a need for an external 6-pin power connector, nor any of the power delivery components that usually reside around that area, reducing the amount of PCB needed significantly. This low power consumption also means that the heatsink can be relatively small, and Sapphire has chosen a simple all-aluminium design from Arctic Cooling to get the job done. It's large enough to push the form factor into dual-slot territory, but temperatures range from 38-45 degrees between idle and load with a very low 47.3-49.9dBA noise generation. In fact this is so low that it's almost unnoticeable from any decent distance away, so you won't notice it once inside a case environment.

It's got two Crossfire nipples along the top of the card (though if you're going to run two

of these it makes more sense to simply buy a faster card at the outset), and three digital outputs on the expansion bracket for up to three screens at once. Overclocking wasn't actually that limited, with a boost of 16 per cent on the core (to 900MHz) and 23 per cent for memory speeds (to 1226MHz). An unfortunate downside to the cooling and PCB design meant that while four of the eight GDDR5 chips sat underneath the fan, four of them were on the rear of the PCB – these became blisteringly hot when overclocked and under load, and the PCB itself became uncomfortably warm.

Performance in games at high resolutions was disappointing compared to higher-end cards, but not surprising considering the market. 3DMark benchmarks showed the speed of the card remained slightly higher than a GT240, but the 1GB of included memory in Sapphire's version bumps the price up quite high. It's still a nice choice for low-powered gaming rigs or if your budget only stretches that far, but performance junkies will need to search elsewhere for their next high. **JR**

Sapphire 5670 3d Mark scores

3DMark 05 - 11666

3DMark Vantage - P6224

Score

Sapphire 5670 Gaming Benchmarks

Average - 13.68

Minimum - 9.56

Maximum - 16.84

Average - 25.48

Minimum - 4.00

Maximum - 33.00

Crysis
Race Driver: GRID

= Reference scores: XFX 5850

Frames per second

Performance
Not groundbreaking, but it's a nice overclocker.

76

Bundle
ArcSoft SimHD included, no game.

80

Value
Not bad, but should be cheaper.

82

Build
Small and quiet, though hot if overclocked.

91

Overall
A decent enough choice for low-powered gaming.

82%

Razer Emperor Gaming Mouse

Another month, another shiny Razer product – can this one win our hearts?

Street Price TBC (\$US80) **Supplier** Razer
Website www.razer.com

Specifications 5600dpi 3.5G Laser sensor; On-board Memory; 1000Hz response rate; seven buttons.

To the untrained eye, this new mouse from Razer almost doesn't look like a Razer mouse at all. For one thing, it's not symmetrical – good news for dedicated righties, possibly not so for those cursed with cack-handedness. For another, Razer's also ditched the usual rubberised coating of many of its products in favour of a simpler matte and gloss plastic finish. This move is altogether more hard to judge.

The Emperor's design is completed by a dimpled rubber mousewheel, and a pair of thumb buttons. This pair is pretty neat, and can be moved backwards and forwards along the mouse's housing by using a slider hidden under the mouse. In practice, this is a cool touch, allowing you to customise these buttons so they are either right under your thumb, or safely out of the way. All this is capped off with a long, and cloth-enclosed USB cable – that kinks. A lot.

There's a mess of further customisation via the included Emperor software – though,

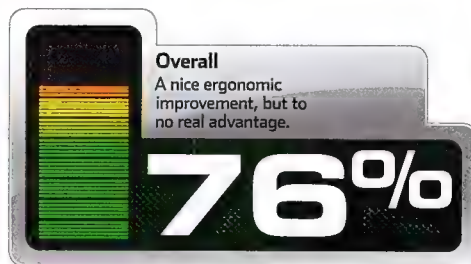
this is not included in the purchase package. Instead, you'll need to download it post-purchase, which is a touch lazy in our eyes, especially given the amount of card and paper bumpf in the packaging; do we really need a drinks coaster instead of required software?! Still, the software is well put together, and will let you put together a host of game specific macros and save them onto the mouse – perfect for LANing on strange machines.

We put the mouse through our usual Modern Warfare killhouse training level, and it's performance was... well, average. Our stock mouse is a Razer Lachesis (the same as the one on our gaming LAN, if you've attended one recently), and the Emperor was more or less on par. In action, the ergonomic improvements of the asymmetrical design bring very little to the table, and the little and second finger positioning is particularly odd. Perhaps worst of all, the shiny plastic thumb rest is the enemy of sweat, leading to some poor control in warm climes.

If you really must have a new Razer mouse, this is likely the pick of the mix, but at \$US80



it's likely going to be a touch too expensive to justify an upgrade, and lacking in outright performance or comfort. **DH**



Cyber Snipa Silencer

Can this Silencer keep the enemy at bay and your hands comfy?

Street Price TBC **Supplier** Digital World Warehouse
Website www.cybersnipa.com

Specifications 5000dpi Laser sensor; On-board Memory; 1000Hz response rate; nine buttons.

Cyber Snipa is probably better known for cheap and cheerful gear rather than performance specced stuff, but its mice usually buck the trend. The Stinger, the last mouse we looked at, is still in use about the Labs, and while the Silencer shares the outlandish looks to a degree, under the blinged up hood there's some mighty fine substance.

Design-wise, the Silencer is wildly asymmetric – left-handed gamers will get cramped just looking at this. It's a combination of smooth plastic and light rubber, combined with elegant ergonomic curves. The entire right side can be popped out, too, allowing you to choose between two different finger rests, and under here you'll also find the entirely superfluous (in our opinion) weighting system. There's some awkwardly placed shiny lights to indicate your DPI settings, and the usual underslung light at the mouse's rear if you like your gaming gear to look like something of a drift track.

Sadly, there's no cloth-wrapped cable, though at least the one included, though a touch short, seems pretty much kink-free.

There's the usual software, too, so you can program the Silencer's many buttons, and it's elegant enough – though it would be nice to be able to edit or turn off the lighting. One button that seems quite useless though is the Rise button, which seems to do a whole lot of nothing.

But that aside... man, what a mouse!

We swapped out the pre-installed side-grip for the wider, two-finger model, and in use this set-up practically hugs your hand. Performance in our Modern Warfare killhouse testing showed only a slight improvement in performance, but in terms of comfort, this is one of the best mice we've ever used. You can literally relax your grip, instead letting the mouse (and especially the rippled rubber thumb-rest) grip your hand – if you suffer from cramping at all during long gaming sessions, this is a Godsend of a product.

It's not the best overall, of course – in terms of features and performance, that crown still



belongs to Microsoft (see our KitLog). But for comfort and grip, we're happy to loudly proclaim the Silencer as king. **DH**



Thermaltake Element V

As easy as 1-2-3.

Street Price RRP\$219 Supplier Anyware
Website www.anyware.com.au

Specifications 220 x 532 x 537mm (W x H x D); 2 x 120mm fan (front intake); 1 x 120mm fan (rear exhaust); 1 x 200mm fan (top exhaust); 1 x 230mm fan (side intake); 5 x 5.25in drive bay (external); 6 x 3.5in drive bay (internal); 1 x 2.5in drive bay (internal); EATX, ATX, M-ATX; Steel construction, 14.13kg

As we slowly waded our way through Thermaltake's Element alphabet, passing through G and T and S, we've finally found ourselves stopped outside the Element V. Perhaps not the most uniquely named case in the world; it's certainly the largest out of all the cases we've seen in this range, packing up to EATX motherboards within its black, hulking frame. Sticking well and truly with the black and red trend that has flowed from the first Element case, the entire case is anodised black steel externally, with red LED fans providing a nice contrast.

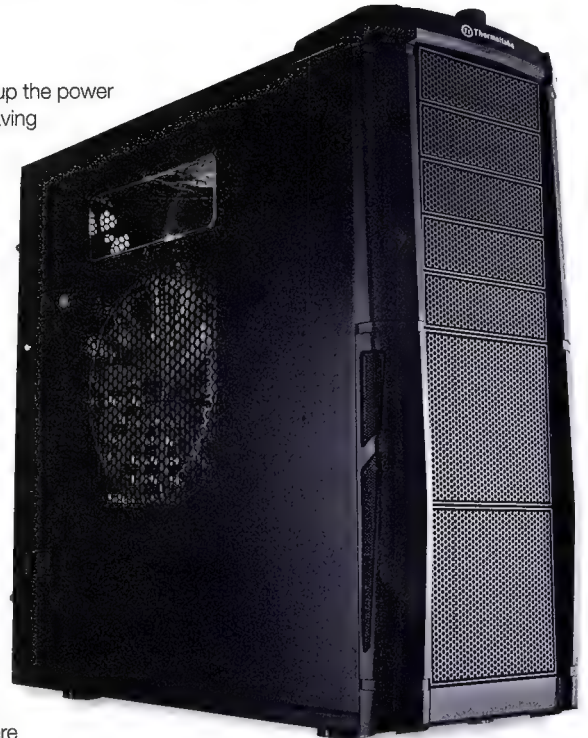
The I/O panel on the top of the case is the only part that has a solid red colour applied, framing the four USB ports, eSATA and mic/audio. There is a large power and reset button that have a firm action to them, though bumping them will be as easy as slight bump when groping for the large fan control dial (that can also control the LED lighting in the fans). Underneath these ports lie five 5.25in bays that lie behind a plastic/mesh fascia, with a filtration material applied to stop most of the dust entering the case. A 120mm fan intakes air at the front, and intake duties are aided by a large 230mm fan on the left-hand sidepanel. This fan is powered by molex, and uses Thermaltake's

nifty wiring method that connects up the power when the sidepanel is attached, saving arm-batics when putting the system together.

Exhaust duties are handled by a 200mm fan on top of the case, and a 120mm rear fan. These aren't the best quality, but should remove a lot of the hot air from inside the case. The rear of the case isn't anodised, but like most of the case it is constructed from quite thick steel that gives it a definite feel of sturdiness. Weighing in at just over 14kg this isn't a lightweight case in any sense of the term, and even the sidepanels are heftier than a construction worker's beer belly.

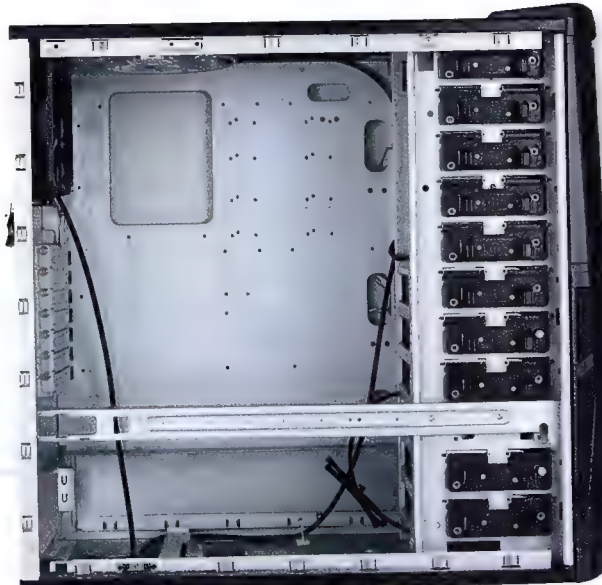
Once inside the case we found ourselves pretty disappointed by what we saw, with bare steel showing a standard EATX/ATX mobo layout. There is a large cutout behind where the CPU socket will be for installing heatsinks, and some minimalist cutouts for cable routing, but there isn't enough room behind the motherboard tray to really do anything useful. At a stretch you'll be able to run an 8-pin cable, but the 24-pin ATX cable will never fit back there and instead will have to be strung across the mobo in a decidedly coarse fashion.

While the PSU mounts at the bottom of the case in the more popular method, it sits on hard metal rails above honeycombed venting that has no dust filter. There are tool-less plastic



securing methods for keeping the harddrives in place, but these feel quite cheap, and aren't vibration dampened. Perhaps most irritating is the large steel bar that runs across the expanse of the mobo area, which detracts a lot from the relatively clean layout. All things considered it's a relatively functional internal layout, but it's not good for cabling.

The Element V may be the biggest case in the series, and while it's got great airflow and cooling potential it is let down by complete lack of vibration dampening, with a hefty measure of awkward cabling thrown in too. **CS JR**



Build
It might be heavy,
but it sure is sturdy.

80

Value
It's pretty cheap for
this much case.

85

Cooling
Plenty of fans to get
things flowing.

92

Features
Some nice external
ideas, but there's not
much action inside.

80

Overall
If you like the looks, the
Maelstrom is a good choice.

81%

Antec Six Hundred

Not quite as many hundreds as other cases.

Street Price \$115 **Supplier** Altech
Website www.altech.com.au

Specifications 212 x 491 x 559mm (W x H x D); 1 x 120mm fan (rear exhaust); 1 x 200mm fan (top exhaust); 3 x 5.25in drive bay (external); 6 x 3.5in drive bay (internal); ATX, M-ATX; Steel construction, 6.9kg

Gallery www.atomicmp.com.au/?163110

A good case is the most important part of any serious build, if not just for somewhere to put all the components. They'll provide you with shelter, fresh air and some serious street cred for all the tech you choose to place inside their cold, metal frames, but no two cases are built the same (unless they're the same model). We've seen all sorts from Antec before, but the Six Hundred is a little like a see-saw that has been stacked with all sorts of ideas. Heaped upon this metaphorical mental pile of concepts is a fascia that looks like a fancier version of the Two Hundred case, a case layout that echoes the original Nine Hundred design and an internal layout similar to the other members in the Hundred range.

There's plenty of thought put into the I/O panel at the top of the case, with some very clicky buttons that have excellent response, though the labelling isn't clear on the audio jacks – you'll have to learn which port does which through use. From here the case stretches onwards with an abstract grillework to reach the large 200mm fan exhaust at the top of the case, framed underneath with a smoked plastic panel so you can peer into the depths of the case, if you're so inclined. While the intricacy of the design does look pretty good at first glance, it is unfortunately constructed from

plastic that while obviously saves costs, but does make it seem cheap.

The sidepanels on the Six Hundred are constructed from a thin sheet of steel like much of the case, though the left-hand side comes with a pretty stylistic window panel cut into it. This isn't quite as elaborate as the Nine Hundred's elongated design, but it's still more than enough to show off all your expensive parts within. The window even comes with a 120mm cutout for an intake fan, and what's more is that it comes with vibration dampened mounts to reduce the plastic-on-acrylic vibration noise!

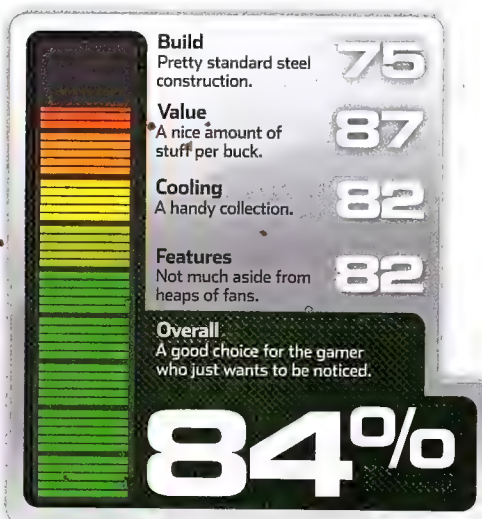
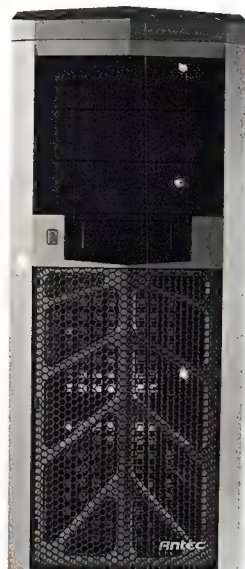
The rear of the case is the typical Antec design, boasting a large 120mm exhaust fan that lies adjacent to a simple fan speed controller which, with simple flicks of a switch, can disable the LED lighting in the larger exhaust fan and slow down either of the two rear fans. There are cutouts for watercooling next to the expansion slots, but these aren't grommeted and will slice through tubing faster than an Irishman can drink in a distillery.

Once inside the case you'll find it as bare as a moth-infested cupboard, with only the most basic ATX layout available and a power supply that merely rests on raised metal bumps. The harddrives install inside a large column of steel at the front, with up to six available (and even space



to install two 120mm fans for intake), and three 5.25in devices at the top. While there's plenty of room for tech none of it is tool-less, and the budget skew of the case rears its head once again. The feet underneath the case aren't cheap plastic ones however, with a grippy rubber disc in each corner keeping the case pretty stable.

For the price you're getting a pretty nice case, and it's definitely a good amount of value for your buck. It does skimp on some of the premium features, but at the end of the day it holds and cools all your tech – and that's all you can really expect from a case. **JR**



Inwin Maelstrom

Circling the drain, or certain success?

Street Price \$215 **Supplier** Inwin
Website www.inwin-style.com

Specifications 225 x 550 x 600mm (W x H x D); 1 x 120mm LED Fan (front); 1 x 120mm LED Fan (top); 1 x 120mm LED Fan (rear); 1 x 220mm LED Fan (side); 4 x 5.25in drive bay (external); 1 x 3.5in drive bay (external); 6 x 3.5in drive bay (internal); E-ATX, ATX, M-ATX; SECC Steel with meshed panel; 600W included PSU

Gallery www.atomicmpc.com.au/?154443

If you asked an Inwin employee what they thought of the Maelstrom, they'd probably respond with the slightly awkward catchphrase of the case: "Luxurious full tower to outshine your competition". Perhaps you won't be doing this (nor even understand it), but amusing descriptions aside it's clear that this is one of the more unique designs we've seen through the pages of the mag. A Maelstrom is a swirling torrent of water in a circular direction; with a large 22cm side panel fan, the rest of the case taking a decidedly industrial look.

The front of the case is the forefront of this ethos, with four 5.25in bays hidden behind sturdy elongated honeycomb panels, coated in mesh and backed with a filtering material to keep out dust. Two lustrous green handles are attached to the front of the case, and while these look pretty damn awesome they're not functional or load-bearing in the slightest, to the point of being completely useless. Their appeal is further marred by a large sticker placed on the upmost handle that refuses to peel off cleanly, leaving behind a hideous goop.

However, the top of the case regains and maintains the functional industrial design with plenty of I/O ports; offering a large complement of four USB, mic/audio jacks, Firewire and two

handy eSATA ports. Power and reset buttons are also here, which each feel excellent, though the reset button might be accidentally bumped if you're not careful. The rear of the case is the usual upside-down ATX layout, placing the PSU at the bottom of the case (aiding stability) with a large 120mm exhaust fan at the top. There are four grommeted watercooling cutouts back here, and why you'd ever need more than two is a question that not even the sands of time will answer. The bare metal here is anodised a nice black, and the expansion slots are meshed to allow a nice amount of airflow through.

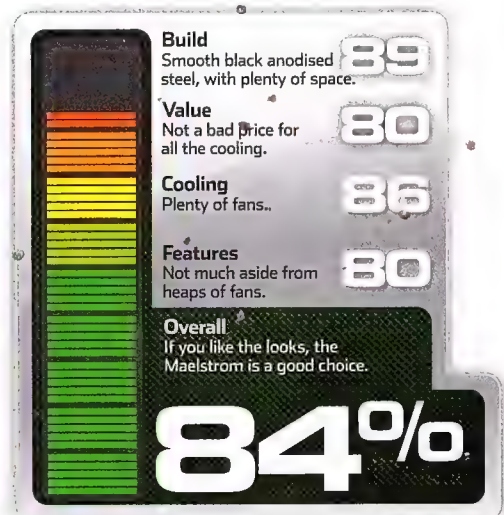
Airflow seems to be one of the strongest traits of the Maelstrom, and with a 120mm intake fan at the front sucking in cool air, matched on the sidepanel by a large 220mm fan that can have green LEDs switched on and off by a simple switch. Exhaust duties are handled by a 120mm fan at the top and rear of the case, totalling four large fans that move a lot of air – but if you're feeling slightly mental, you can replace the 220mm side fan with six 120mm fans in its place! This isn't the smartest idea since the panel is unfiltered mesh, but at least all the fan mounts are vibration dampened.

The insides of the case are quite spacious with enough room for EATX motherboards, six hard drives and the longest power



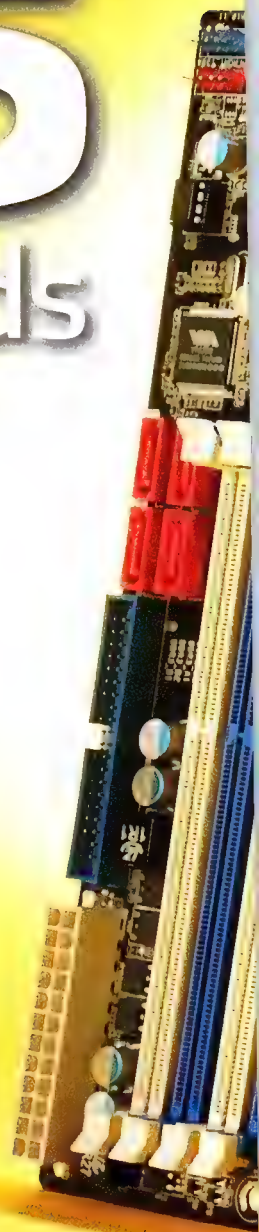
supplies on the market. While there isn't any room at all behind the motherboard tray (a frustrating omission), there is sound-dampening foam that has been applied to both panels. The actual effect of this is ruined somewhat by the excessive amount of venting and large number of fans, but hey, it's the thought that counts.

While our review unit didn't come with one, retail Maelstroms seem to have a 600W PSU included – though a dedicated unit from Antec, Corsair or Seasonic will always be better. The Maelstrom is a decent gaming case that you'll either love or hate – but we don't mind it.



Sub \$160 Core i5 motherboards

James Gorbald and **Antony Leather** test the best, make a mess, and diss the rest.



Unlike the highly successful Core 2 and Core i7, Intel's latest CPU series, Core i5, has got off to a pretty shaky start. The biggest problem was that while the Core i5-750 was significantly faster than the best Core 2 CPU, suitable LGA1156 motherboards were far too expensive.

Three months down the line, cheaper LGA1156 motherboards have finally started to appear, so we thought it was high time to take another look at Intel's official replacement for the now-aging Core 2 series.

Although there are now quite a few cheaper LGA1156 motherboards from which to choose, as the Core i7-920 remains our first-choice CPU, we still think it's only worth upgrading to Core i5 if the motherboard costs less than \$160. For this reason, we've rounded up ten such motherboards, and put them through a barrage of tests, at both their stock settings and when overclocked, to determine which is the best. Read on to find out whether or not now is the time to upgrade to Core i5.



Features Table

	ASRock P55M Pro	Asus P7P55D LE	Asus P7P55-M	ECS P55H-A	Gigabyte GA-P55M-UD2	Gigabyte GA-P55-UD3	MSI P55-CD53	MSI P55M-GD45
Price	\$130.00	\$145.00	\$135.00	\$160.00	\$130.00	\$130.00	\$140.00	\$136.00
Dimensions (mm)	224 x 244	305 x 218	218 x 244	305 x 244	244 x 244	305 x 244	305 x 215	245 x 235
Chipset								
Chipset	Intel P55	Intel P55	Intel P55	Intel P55	Intel P55	Intel P55	Intel P55	Intel P55
RAID	Intel P55	Intel P55	Intel P55	Intel P55	Intel P55, Gigabyte SATA2	Intel P55, Gigabyte SATA2	Intel P55, JMicron JMB363	Intel P55
Audio	Intel HD Audio via VIA VT1708S with 8-channel support	Intel HD Audio via VIA VT1828S with 8-channel support	Intel HD Audio via VIA VT1708S with 8-channel support	Intel HD Audio via Realtek ALC888 with 8-channel support	Intel HD Audio via Realtek ALC888 with 8-channel support	Intel HD Audio via Realtek ALC888 with 8-channel support	Intel HD Audio via Realtek ALC889 with 8-channel support	Intel HD Audio via Realtek ALC888 with 8-channel support
Ports								
PCI	1	3	1	2	2	3	3	1
PCI-E graphics	Two 16x PCI-E (CrossFire)	Two 16x PCI-E (CrossFire)	One 16x PCI-E	Two 16x PCI-E (CrossFire)	Two 16x PCI-E (CrossFire)	Two 16x PCI-E (CrossFire)	One 16x PCI-E	Two 16x PCI-E (CrossFire)
Other PCI-E	N	N	N	One 4x PCI-E	N	N	N	N
1x PCI-E	1	2	2	2	N	2	3	1
DIMM	4 x DDR3	4 x DDR3	4 x DDR3	4 x DDR3	4 x DDR3	4 x DDR3	4 x DDR3	4 x DDR3
3Gbps SATA / eSATA	4 (RAID capable) / 2	6 (RAID capable) / 1	6 (RAID capable) / 0	6 (RAID capable) / 1	7 (RAID capable) / 1	8 (RAID capable) / 0	8 (RAID capable) / 2	6 (RAID capable) / 2
Audio	4 x surround audio out, coaxial and optical S/PDIF out	4 x surround audio out, optical S/PDIF out	4 x surround audio out	4 x surround audio out, optical S/PDIF out	4 x surround audio out, coaxial and optical S/PDIF out	4 x surround audio out, coaxial and optical S/PDIF out	4 x surround audio out	4 x surround audio out
LAN; WiFi	1 x 10/100/1000	1 x 10/100/1000	1 x 10/100/1000	1 x 10/100/1000	1 x 10/100/1000	1 x 10/100/1000	1 x 10/100/1000	1 x 10/100/1000
USB 2 / FireWire	12 / 2	14 / 0	14 / 1	14 / 0	14 / 2	14 / 0	14 / 0	10 / 2
Overclocking control								
Base Block (max)	300MHz	500MHz	500MHz	600MHz	1.2GHz	1.2GHz	600MHz	600MHz
CPU multiplier change	Y	Y	Y	Y	Y	Y	Y	Y
CPU voltage (max)	1.6V	1.7V	+630mV	+630mV	1.9V	1.9V	+371mV	+389mV
IMC voltage (max)	N	1.45V	1.45V	N	N	N	N	N
RAM voltage (max)	2.4V	2.2V	2.145V	+630mV	2.6V	2.6V	2.4V	2.405V
P55 chipset voltage (max)	1.25V	1.15V	1.15V	+300mV	2V	2V	1.953V	1.953V
CPU VTT voltage (max)	2.55V	N	N	+630mV	1.99V	1.99V	N	2.018V
CPU PLL voltage (max)	2.18V	2.1V	2.1V	N	2.54V	2.54V	2.4V	2.43V
Cooling								
Chipset	Heatsink	Heatsink	Heatsink	Heatsink	Heatsink	Heatsink	Heatsink	Heatsink
VRMs	N	N	Heatsink	Heatsink	N	Heatsink	N	N
Fan headers	3	4	2	4	2	4	3	3

MSI P55M-GD45

A promising start, but it's only useful if you need to send smoke signals.

Street Price \$136

Manufacturer www.msicomputer.com

The P55M-GD45 is one of the growing numbers of micro-ATX motherboards, and like the Gigabyte GA-P55M-UD2, it doesn't skimp on features.

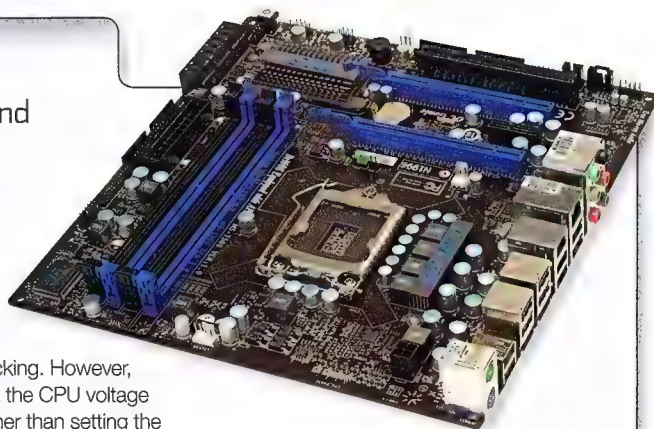
CrossFire is supported, although the second 16x PCI-E slot only provides a performance-limiting four lanes, while the top slot rockets along with the full 16 lanes. There are six RAID-capable SATA 3Gbps ports and a generous two eSATA ports on the I/O panel. Expansion slots come in the form of one PCI slot and a single 1x PCI-E slot, although the latter will be obstructed if you install a dual-slot graphics card in the secondary 16x PCI-E slot.

The board's layout is generally good, with plenty of space around the CPU socket, angled SATA 3Gbps ports and well-placed power connectors. There's even a power button in the bottom right-hand corner to make testing the board easier before you install it in a case.

The BIOS proved to be a relatively pleasant place in which to spend time, with plenty of options for overclocking. However, a fly in the ointment was that the CPU voltage is adjusted incrementally rather than setting the absolute value.

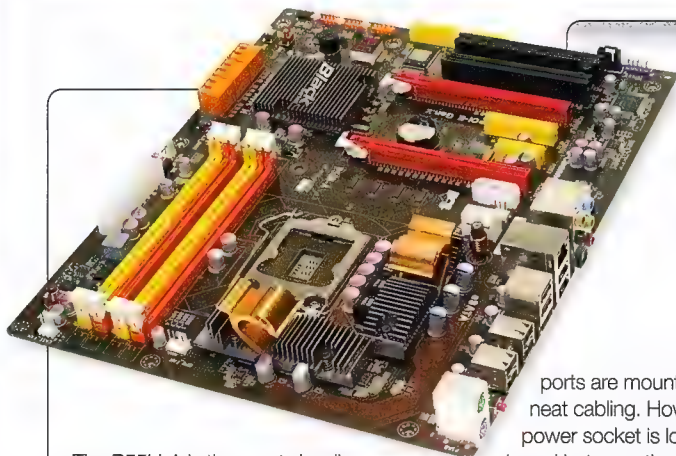
Performance was good, with the P55M-GD45 coming fourth overall in our Benchmarks with a score of 1,490. It was quick in Crysis too, with a minimum frame rate of 26fps, although it returned a very slow SATA average read speed of 169MB/sec; this compares poorly with its sibling, the P55-CD53, which reads at 225MB/s. As a result, your shiny new SSD may suffer.

Unfortunately, in the middle of a promising overclocking session, the P55M-GD45 gave up being a motherboard and decided send out smoke signals instead, as one of the VRMs started to smoulder. This occurred while we were using the same voltage settings as all the other motherboards, so it would appear that the



P55M-GD45 doesn't like being pushed this far.

Ultimately, even if you aren't interested in overclocking, the Gigabyte GA-P55M-UD2 is a superior choice, due to its more intuitive BIOS and lower price. **AL**



The P55H-A is the most visually distinctive of all the motherboards in this Labs test, being a mixture of black, yellow and orange plastic. It's also one of the few motherboards to sport on-board power and reset switches, plus VRM heatsinks.

Although the P55H-A has two 16x PCI-E slots, each of these will only provide eight lanes if you install a pair of graphics cards. Unlike all the other motherboards in this Labs test, which only provide four lanes to their secondary slot, this will be sufficient to run two ATI cards together in CrossFire. There are also two PCI slots, a single 1x PCI-E slot and a 4x PCI-E slot.

All six of the RAID-capable SATA 3Gbps

ports are mounted parallel to the PCB for neat cabling. However, the 8-pin EPS12V power socket is located in the centre of the board between the CPU socket and primary 16x PCI-E slot. This is a terrible location, as it means the cable will straddle across the PCB, thus reducing airflow.

The P55H-A was the fastest motherboard at its default BIOS settings, achieving a solid 1,526 overall score in our Benchmarks, despite having a slow SATA controller. However, it is thoroughly unpleasant to overclock, as the BIOS forces you to increase all the voltages in increments, rather than setting the absolute value. This makes it very easy to make a mistake, and over- or undervolt a component/bus.

The P55H-A also doesn't recover well from overly ambitious overlocks – we had to remove the ATX power connector before it would boot

successfully. As a result, it would only run Prime95 stably with a 210MHz Base Clock and benchmark the CPU at 4GHz, resulting in an overall Benchmarks score of 2,064.

Despite its good performance, the P55H-A isn't the best overclocking motherboard we've seen. Throw in the poor PCB layout, price tag and unintuitive BIOS, and it's hard to see how we could recommend buying it. **JG**



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2x
Copper

ASUS P7P55D LE

A good performer, but it's a temperamental overclocker.

Street Price \$145

Manufacturer www.asus.com.au

Like Gigabyte, Asus has already released a silly number of P55 motherboards, with the P7P55D LE taking up position midway in the massive line-up.

The P7P55D LE is an ATX-sized board, so it has seven expansion slots – two 16x PCI-E, two 1x PCI-E and three PCI. However, the second 16x PCI-E slot only has four lanes; this is sufficient for a graphics card to run Folding@home, but not fast enough to run a ATI graphics card in CrossFire.

The P55 chipset powers six RAID-capable SATA 3Gbps ports, although Asus has mounted only two of them parallel with the PCB. The remaining four ports are mounted at a 90-degree angle to the PCB, so the cables will stick up awkwardly. There's also a collection of 14 USB 2 ports and an eSATA port, plus analogue and optical S/PDIF audio outputs on the rear I/O panel.

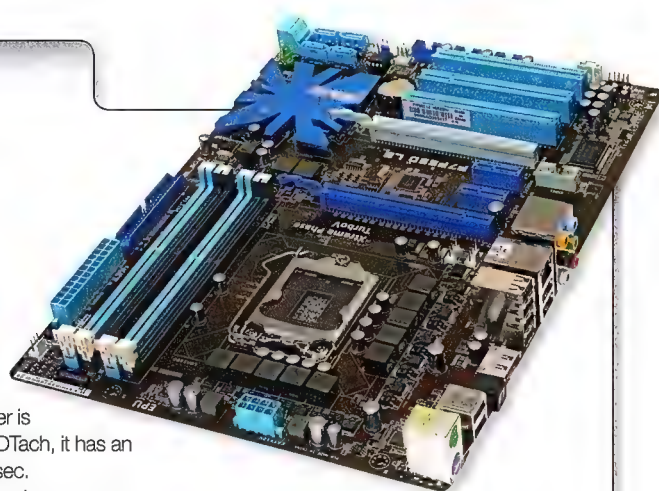
The P7P55D LE achieved the second fastest overall score in our Media Benchmarks;

its score of 1,517 was only just beaten by the ECS P55H-A. It wasn't particularly fast in Crysis, though, with a minimum frame rate of 24fps. The SATA controller is also pretty slow; according to HDTach, it has an average read speed of 187MB/sec.

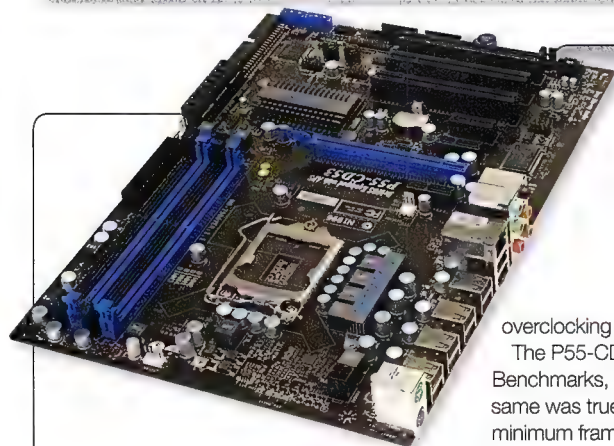
Although the BIOS is very easy to use, we found it didn't like rebooting when overclocked – even at settings that had previously worked well. The only way to get around this problem was to power down the system and cold-boot it.

After several frustrating experiences with this, the maximum stable Base Clock achieved 220MHz, one of the higher results. However, with the CPU multiplier back at its default, the P7P55D LE could only overclock the CPU to 4GHz, 100MHz less than two of Gigabyte's budget P55 motherboards. As a result, the P7P55D LE was outpaced by six other motherboards when overclocked.

While the board lacks any glaring flaws, its



BIOS is temperamental and it isn't particularly fast when overclocked. Given its high price, this board is hard to recommend. **JG**



With the MSI P55M-GD45 going out in a cloud of smoke, we turned our attention to its larger sibling.

The P55-CD53 has by far the best layout of any motherboard on test in this Labs test. There's only one 16x PCI-E slot, but even if you install a dual-slot graphics card, only one of the three 1x PCI-E slots will be obscured, while the three PCI slots are left free.

There are eight RAID-capable SATA 3Gbps ports, six from the P55 chipset and two from a JMicron JMB363 controller. The P55-CD53's six ports are mounted parallel with the motherboard for neat cabling, while the cables attached to the two additional ports will protrude. There's also a power button and

overclocking controller – more on this later.

The P55-CD53 scored 1,471 in the Media Benchmarks, which is an average result. The same was true in Crysis, where it managed a minimum frame rate of 27fps. The SATA average read speed was excellent, though, with the P55-CD53 posting the second highest speed – 225MB/sec. This should do justice to your shiny new SSD. However, you'd be well advised to avoid the JMicron-powered ports, as these could only manage a truly atrocious 139MB/sec.

Although we could run Prime95 with a Base Clock of 210MHz using a CPU VTT of 1.35V and reduced CPU multiplier, we were unable to overclock the CPU past 3.8GHz using its default multiplier. This overclock required a vcore of 1.35V, with the chipset at 1.338V, the CPU PLL at 2.02V and the RAM set at 1.65V.

Not surprisingly, the overclocked P55-CD53 suffered compared with the other higher overclocked motherboards, returning an overall Media Benchmarks score of just 1,990. Crysis

was also noticeably slower, with the minimum frame rate of 30fps a long way behind the competition.

If you aren't feeling brave, the P55-CD53 has a feature called OC Genie, which is a semi-automatic overclocking tool that's used in conjunction with the controls on the PCB. While the P55-CD53 isn't a bad board, its limited overclockability means that it's outpaced by lots of the other motherboards in this Labs test. **AL**



MSI P55-CD53

Brilliantly laid out, but it struggled to keep up with other motherboards on test.

Street Price \$140

Manufacturer www.msicomputer.com

ASUS P7P55-M

Cheap and cheerful, but on the slow side.

Street Price \$135

Manufacturer www.asus.com.au

Asus was responsible for kick-starting the movement towards enthusiast-quality micro-ATX motherboards earlier this year. However, on paper at least, the P7P55-M appears to have fewer features than the Gigabyte and MSI micro-ATX boards in this Labs test, as it doesn't support CrossFire. This isn't a major loss, though, as the other two boards only provide four PCI-E lanes to their second 16x PCI-E slot, which will cripple the performance of any graphics card. As well as its 16x PCI-E slot, the P7P55-M also has two 1x PCI-E slots and a single PCI slot.

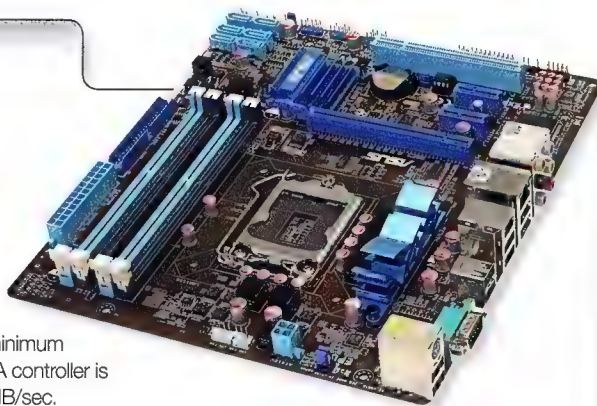
Another sensible decision by Asus is to fit a small heatsink to one of the banks of VRMs. However, Asus hasn't bothered to mount the six RAID-capable SATA 3Gbps ports parallel with the PCB, and as a result, the cables stick up awkwardly from the surface of the motherboard.

At its default BIOS settings, the P7P55-M was the third slowest motherboard in our

Media Benchmarks, with an overall score of 1,391. However, it was very fast in Crysis, with a minimum frame rate of 29fps, while its SATA controller is also pretty nippy, averaging 201MB/sec.

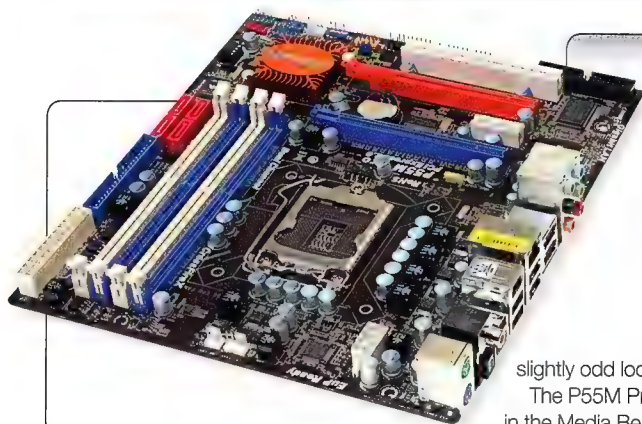
However, unlike any Asus motherboard we've tested in years, the BIOS forces you to increase the vcore in increments, rather than setting the absolute value. This isn't only less precise than setting the absolute value, but it's only practical if you know the vid of your particular CPU. However, the P7P55-M recovers well from overly ambitious overlocks.

By dropping the CPU multiplier and boosting the vcore by 200mV, the IMC to 1.35V, the memory to 1.65V, the CPU PLL to 2V and the chipset to 1.15V, we were able to run Prime95 on the P7P55-M with an above average 220MHz Base Clock. However, with the CPU multiplier back at its default, the P7P55-M was limited to overclocking the CPU to 4GHz – 100MHz slower than two of the Gigabyte motherboards. As a



result, the P7P55-M was one of the slower motherboards when overclocked.

Although the P7P55-M is a good overclocker, it's rather slow. It's also let down by a number of small flaws, such as the unintuitive BIOS and poorly positioned SATA 3Gbps ports. **AL**



The P55M Pro has just one PCI slot located at the bottom of the PCB, a 1x PCI-E slot (which will be unusable if you install dual-slot graphics cards), along with two 16x PCI-E graphics slots. However, the second 16x PCI-E slot only provide four lanes, so you'd be well advised to opt for a motherboard with more PCI-E lanes if you're desperate for CrossFire.

There are also only four RAID-capable SATA 3Gbps ports, so overall, the P55M-Pro isn't as well featured as the GA-P55M-UD2, which has two PCI slots and seven RAID-capable SATA 3Gbps ports. Layout is as good as any of Gigabyte's offerings, though, with no major issues to report, except for the

slightly odd looking Southbridge heatsink.

The P55M Pro returned rather average results in the Media Benchmarks, with an overall score of 1,479. It could only manage a minimum frame rate of 22fps in Crysis, which was the slowest on test. The SATA average read speed was much better though; its average of 224MB/s was streaks ahead of many motherboards, like the Gigabyte GA-P55-US3L.

The BIOS is easy to use, and with the CPU multiplier and RAM divider reduced, it managed a maximum stable Base Clock of 200MHz, using a CPU VTT of 1.35V. Although this isn't a great overclock, the P55M Pro managed to hold this Base Clock when we brought the CPU and RAM back into line, settling on a CPU frequency of 4GHz.

We had to raise the CPU voltage to 1.35V to stabilise this overclock, but the P55M Pro also has a simplified overclocking feature called EZ

ASROCK P55M PRO

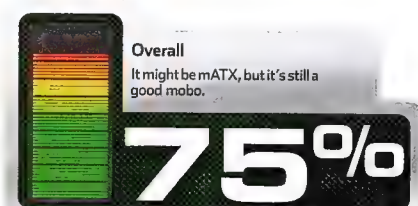
A solid effort, but the Gigabyte GA-P55M-UD2 is a better overclocker.

Street Price \$130

Manufacturer www.asrock.com

overclock, which also managed to push the CPU to 4GHz but with much higher voltages than those we used. The Media Benchmarks saw a 577-point boost and Crysis' minimum frame rate increased from 22fps to 33fps.

The P55M Pro is cheap and a good though conservative overclocker. Unfortunately for ASRock, the GA-P55M-UD2 is a similar price, has better features and is a superior overclocker. **AL**





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Gigabyte GA-P55-UD3

A great overclocker, but it doesn't bring anything over the GA-P55M-UD2.

Street Price \$130

Manufacturer www.giga-byte.com.au

The GA-P55-UD3 retails for about the same price as micro-ATX GA-P55M-UD2, oddly enough.

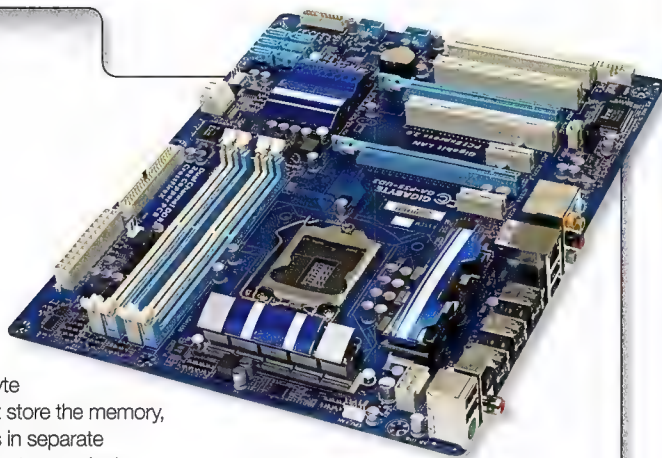
The extra space has been put to good use, as the former has three more expansion slots – one more PCI slot and two 1x PCI-E slots. There are also two 16x PCI-E graphics slots but, like most of the other motherboards on test, if you opt for a CrossFire setup, the bottom slot only provides four lanes, which will cripple performance. As there are also eight RAID-capable SATA 3Gbps ports, the GA-P55-UD3 would make a good base for a mid-range PC.

At stock speeds the GA-P55-UD3 performed poorly, coming last in all three sections of our Media Benchmarks – it was more than 150 points behind the ECS P55H-A. It performed a little better in Crysis with a minimum frame rate of 25fps, and fared much better in the SATA average read

speed test, being one of five motherboards able to return a result above 200MB/sec.

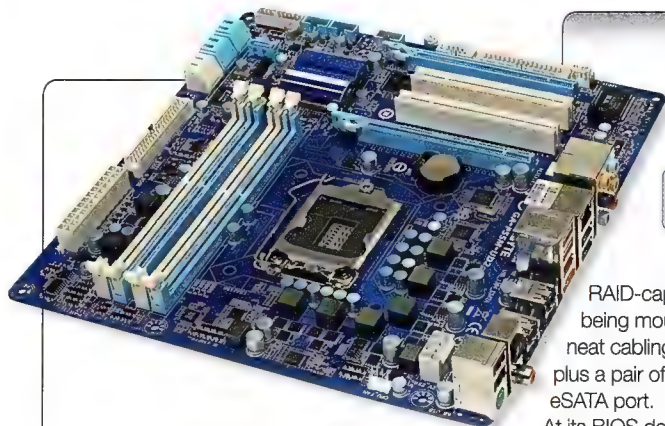
The BIOS of all three Gigabyte motherboards in this Labs test store the memory, voltage and frequency settings in separate sections, so they're less intuitive to overclock than the ASRock P55M Pro. With the CPU multiplier dropped to minimum, we managed to push the Base Clock to 225MHz using a CPU VTT of 1.35V, a chipset voltage of 1.3V and a CPU PLL of 1.9V.

With the CPU multiplier and RAM speed brought back up to speed, we set the vcore to 1.35V and boosted the CPU clock drive from 700mV to 900mV to make it benchmark stably. This allowed us to overclock the CPU to 4.1GHz using a Base Clock of 205MHz and a multiplier of x20. This saw a dramatic performance increase, with nearly 700 points added to the overall Media Benchmarks score. The minimum



frame rate in Crysis also increased by 4fps, while the SATA speed increased to 230MB/sec.

The GA-P55-UD3 is a great overclocker, but the ATX size brings nothing extra to it. **AL**



Gigabyte GA-P55M-UD2

A great little overclocker at a very competitive price



Street Price \$130

Manufacturer www.giga-byte.com.au

RAID-capable SATA 3Gbps ports being mounted parallel with the PCB for neat cabling. There are 14 USB 2 ports, plus a pair of FireWire ports and a single eSATA port.

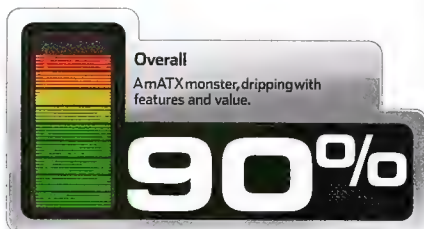
At its BIOS defaults, the GA-P55M-UD2 turned in one of the slowest Media Benchmarks result of any motherboard in this Labs test, with a score of 1,386. However, it was a little faster in Crysis, with a minimum frame rate of 25fps. The six SATA 3Gbps ports powered by the P55 chip read at an average of 228MB/sec, while the port driven by the Gigabyte SATA2 chip was much slower, averaging 174MB/sec.

The GA-P55M-UD2 is a joy to overclock, thanks to its comprehensive and user-friendly BIOS. In our maximum stable Base Clock test, it managed an awesome 225MHz, while in our maximum performance test, it managed to overclock the CPU to 4.1GHz

This overclock required a vcore of 1.35V, a CPU VTT of 1.37V, with the chipset at 1.14V and

the CPU PLL at 1.9V, and boosted the Media Benchmarks score to 2,099 – the fastest score in the Labs test. Crysis and both SATA controllers also saw a substantial performance increase from the overclock.

While the GA-P55M-UD2 lacks many of the flashy features of more expensive motherboards, it's a very desirable little motherboard, especially if you delve in the BIOS and overclock it. As a result, months after it first launched, it's now seriously worth considering upgrading to Core i5. **JG**



While Gigabyte hasn't made a truly great high-end motherboard in a few years, it has an unparalleled track record of success in the lower end part of the market, thanks to boards such as the awesome GA-P31-DS3L.

Gigabyte has managed to keep the price down by opting for the small micro-ATX form factor. Nevertheless, the GA-P55M-UD2 retains four DDR3 DIMM sockets, two PCI slots and two 16x PCI-E slots. Although this means that, on paper at least, the GA-P55M-UD2 supports CrossFire, as the second slot only has four lanes, it isn't really fast enough to power a graphics card in games.

Despite its compact size, the GA-P55M-UD2 is well laid out, thanks to six of the seven

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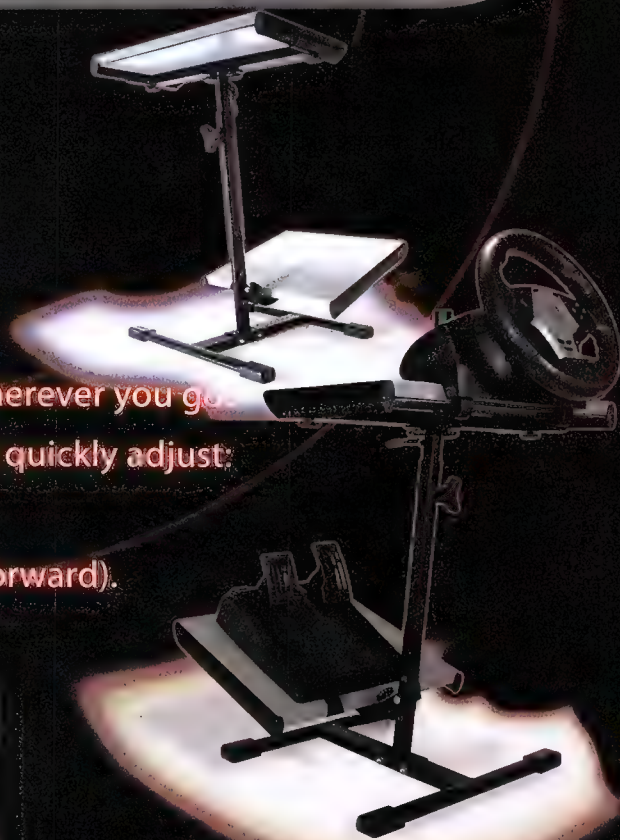
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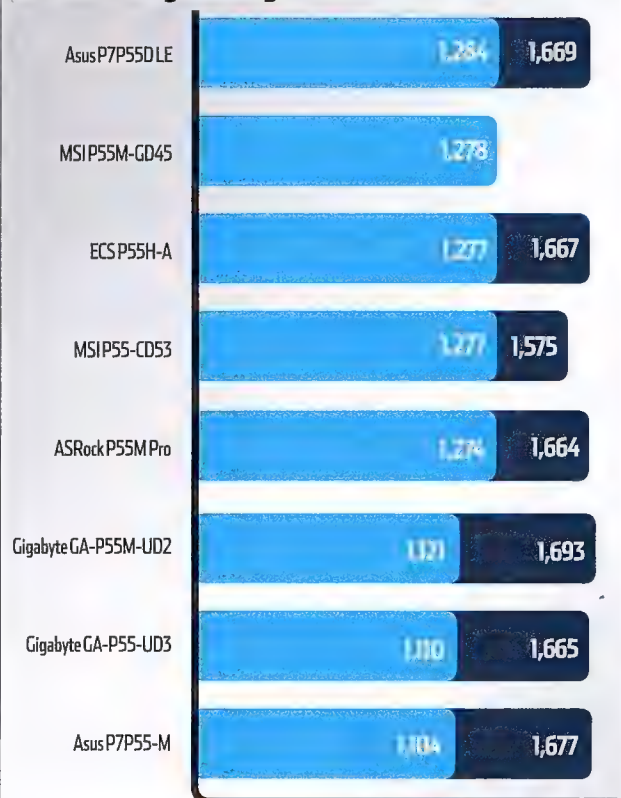
To find your nearest reseller please call 1300 769 399 or visit dww.net.au



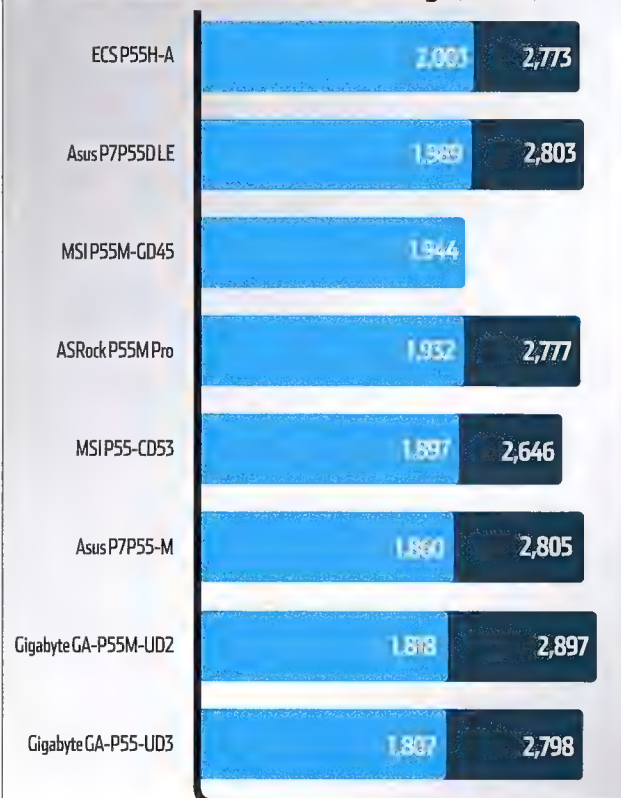
Standard

Overclocked

GIMP image editing



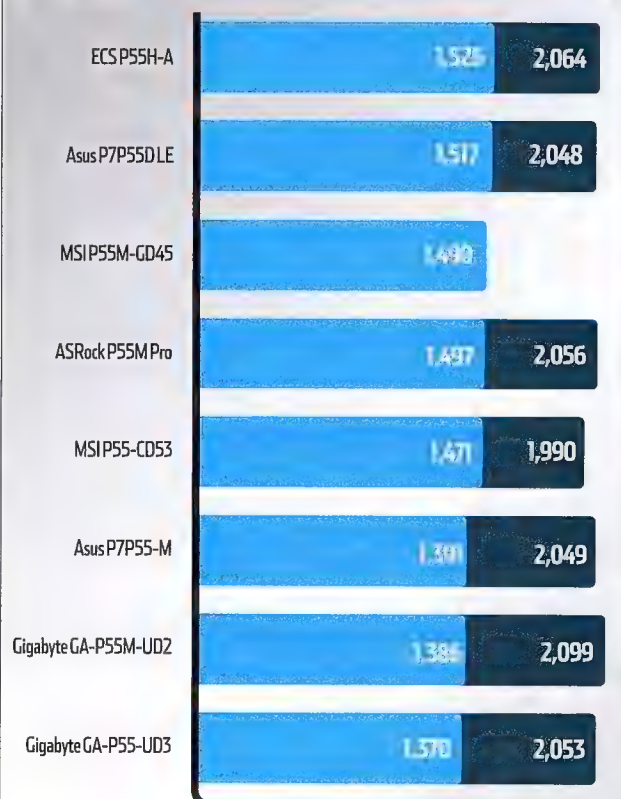
Handbrake H.264 video encoding



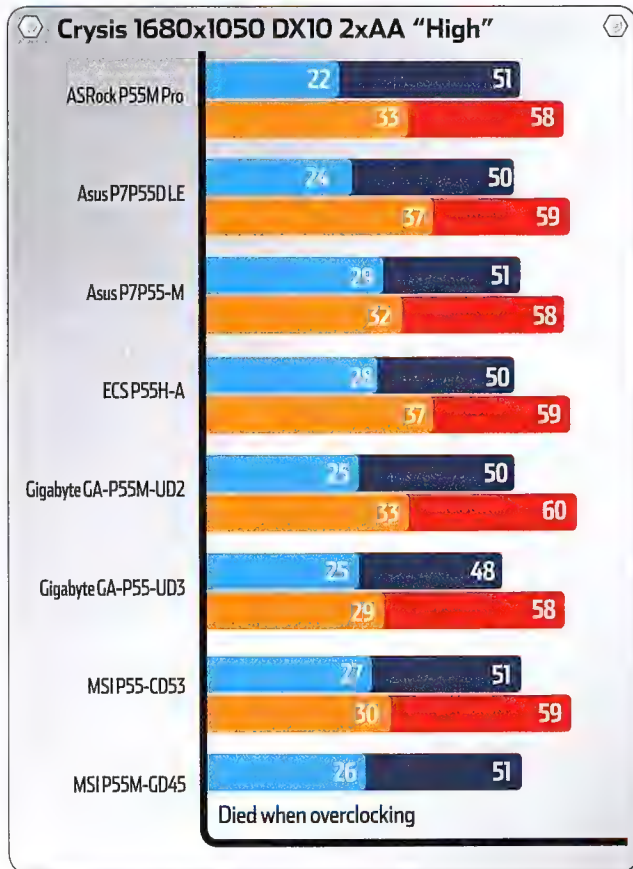
Multi-tasking



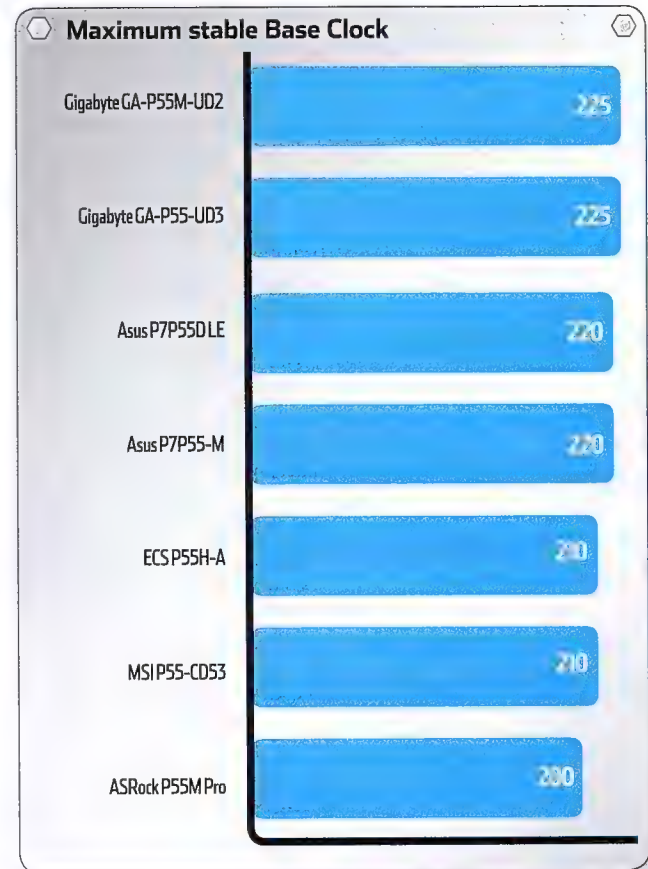
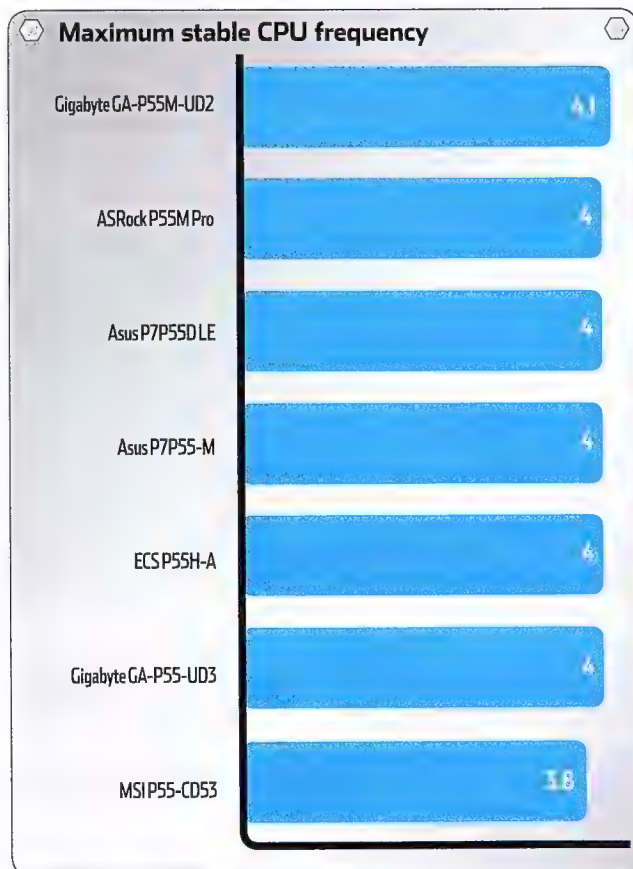
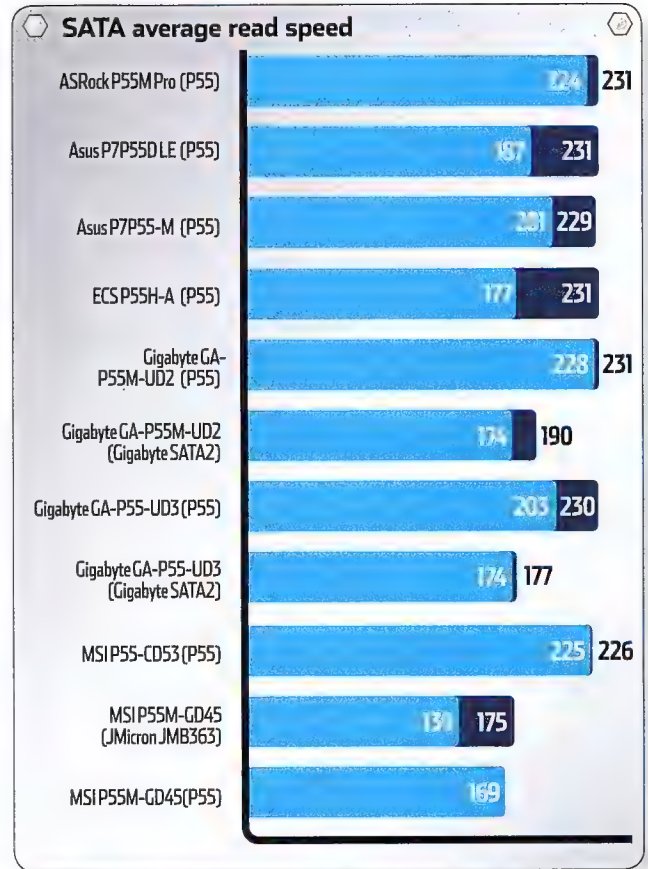
Overall



Minimum Average Overclocked Minimum Overclocked Average



Standard Overclocked



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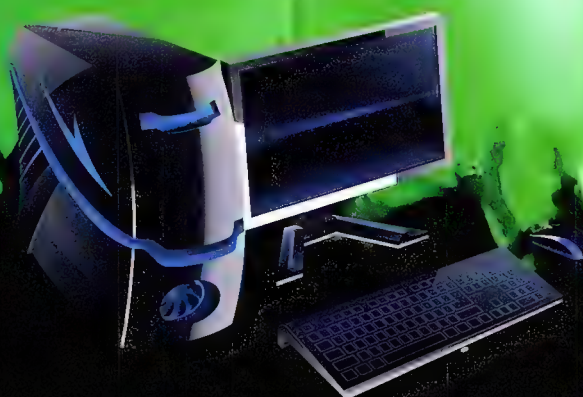
Date 3rd March, 2010

Location Queensland
University of Technology,
Brisbane

Time 1600-2200

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Daniel Rutter ponders the imponderables of AI development.

We are surrounded by artificial intelligence, every day of our lives.

Or there is no AI at all, and never will be.

Which, if either, of these statements is true depends on your definition of artificial intelligence. And the definition of AI has changed a lot over the centuries.

People today often think of AI as meaning "a machine that's intelligent, like we are". That presents the problem that we're not exactly sure what our own intelligence is - don't even ask about what *consciousness* is. But it's a pretty graspable concept.

This 'strong AI', as I've written before (www.dansdata.com/gz092.htm), is still a long way away. We're not even sure in what direction.

But in the past, there have been a lot of much

Intelligent Women, Bless 'Em) Could Ever Do.

And then people came up with machines that did those things. Just as machines also flew, wove cloth, recorded moving images, et cetera.

But a funny thing always happens, right after a machine does whatever it is that people previously declared a machine would never do. What happens is that particular act is demoted from the rarefied world of 'artificial intelligence', to mere 'automation' or 'software engineering'.

Apparently, you see, when they said "a machine will never be able to spot-weld a car together", they meant to say "a machine will never *be aware* that it's welding a car together". So all of those production-line robots aren't actually a triumph of artificial intelligence at all, any more than aircraft autopilots or optical

like a human. How about writing music? How about creating whole movies, or just writing novels, from scratch? I don't mean your typical computer-generated aphasic wind-chime randomness, either - I mean *good* stuff. Or, at least, chart-topping, summer-blockbuster, bestselling stuff.

Bear in mind that we've already got machines rendering near-photorealistic 3D environments on the fly, and pick-and-place robots whipping through tedious item selection and packaging tasks faster than any five trained humans could. Not to mention farmers dozing in the air-conditioned cabin of their tractor while GPS helps it to plough the field autonomously.

This still might not be *that* much of a test, though. How hard can it be to write as well as Dan Brown?

And, how much harder to write as well as Dan Rutter?
dan@atomicmpc.com

Go back far enough and you can find people making these same sorts of predictions about things that seem simple today.

more modest definitions of artificial intelligence. They were often phrased in the form "a machine will never...":

"A machine will never be able to read the written word."

"A machine will never understand speech."

"A machine will never be able to look at something and figure out what 3D shape it is."

"A machine will never drive a car."

"A machine will never play chess."

"A machine will never play chess *well*."

"A machine will never beat a chess Grandmaster."

"A machine will never beat *my favourite* chess Grandmaster."

Go back far enough and you can find people making these same sorts of predictions about things that seem simple today. Arithmetic, algebra, spell-checking; all were clearly Things Only the Mind of Man (and of a Few Unusually

character recognition or the square-root button on a calculator are.

But don't worry - once someone comes up with a computer that can carry on an intelligent IM chat with you, *that'll* be proper AI. (And a machine will never do it, of course!)

I sound as if I'm cross about this, but I'm not, really. I find illogical reasoning and unfounded assumptions about AI being *a priori* impossible or not worthy of government research funding mildly annoying, but I don't find it any more irritating than the reverse phenomenon, in which marketing departments insist that the washing machine they're trying to sell is smarter than HAL.

I think it's an interesting mental exercise, though. Think, for a moment, about the things that *you* currently reckon computers will never be able to do. I'm sure you can come up with some.

I mean, never mind strong AI that thinks just



KITLOG

These are our four basic systems, with something for every taste. On this page, the **Basic Game Box** is put together with money-saving in mind, but also an eye to getting as much bang for buck. It's the best value system for those who want a lot of processing grunt, but who don't want to sacrifice the upgradeability or compatibility that is so important. Intel's going to keep the P55 socket around for quite some time, so making the leap to this new platform is well-timed.

There's nothing better than a keyboard to help you with your fragging at home; but this model is a great ally at any LAN party too. When faced with an all-out assault to steal your favourite can of energy drink, simply rip off the numpad and throw it at your foes to let them know you're seriously territorial.

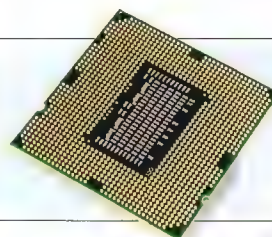


The Perfect PC, on the other hand, is the system everyone aspires to, with nothing but the best parts – without going crazy, though. It's a collection of all the greatest hardware that we'd pick without a budget, sure to impress with performance and sheer style.

Oh, and if you're wondering what the Ref IDs are, that's the ID of that article on our website. Just enter it like this – www.atomicmpc.com.au/?NUMBER – and you'll go straight to that review.

BASIC GAME BOX

CPU



Intel Core i5 750

PRICE \$240

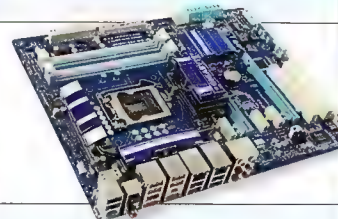
Intel's budget quad is more than you'll need in a chip!
Issue 106, Page 36

MOTHERBOARD

GIGABYTE P55-UD4

PRICE \$225

A great value P55 board with some nice features..
Issue 106, Page 39



MEMORY



G.Skill Ripjaws 2000MH

PRICE \$170

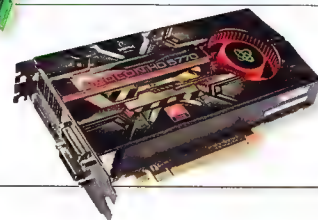
Great value memory with amazing overlocking.
Issue 106, Page 52

VIDEOCARD

XFX 5770

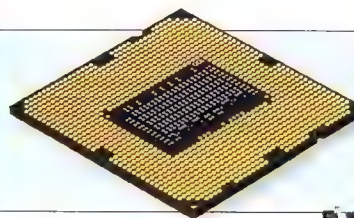
PRICE \$218

A decent value way to get into DX11.
Issue 107, Page 47



THE PERFECT PC

CPU



Intel Core i7 870

PRICE \$690

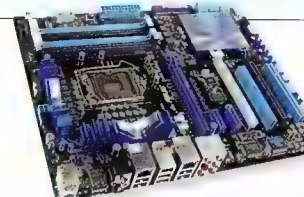
The best enthusiast chip, evar.
Issue 105, Page 44

MOTHERBOARD

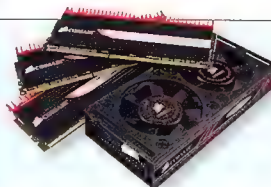
ASUS P7P55D Deluxe

PRICE \$296

Increase your performance, sex appeal and social standing!
Issue 105, Page 41



MEMORY



Corsair Dominator TR3X6G1866C7GTF

PRICE \$388

Plenty of memory, blisteringly fast and darn sexy.
Ref ID: 149838

VIDEOCARD

ATI 5970

PRICE \$850

A dual-core DX11 beast, the most powerful yet.
Issue 108, Page 34



For more builds check out the Kitlog E-mag at atomicmpc.com.au/kitlog

SUBTOTAL: \$1743



Ayuwun A1V8

PRICE \$52

Performs well, incredible value, bloody awesome.
Issue 103, Page 47

CASE



Lancool Dragonlord PC-K62

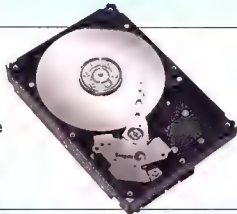
PRICE \$165

Vibration dampened, great cooling and sexy looks.
Issue 105, Page 49

ITB HDD

PRICE \$90

A thousand gigabyte storage drive on the cheap.



KEYBOARD

Razer Arctosa

PRICE \$50

A cool-looking keyboard that'll serve you very well.
Ref ID: 149483

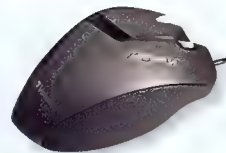


Viewsonic VX2233WM

PRICE \$199

21.5 inches of value-packed screen, great buy.
Issue 108, Page 42

MOUSE



Verbatim Rapier V1

PRICE \$65

Great gaming performance and nifty features.
Issue 96, Page 43

Plantronics Gamecom 777

PRICE \$94

Solid set of cans with great audio.
Issue 101, Page 41



Onboard Realtek ALC889A

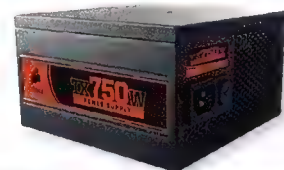
A decent chip that does the job.

POWER SUPPLY

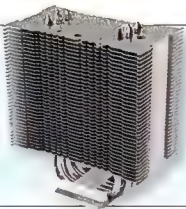
Corsair TX-750

PRICE \$175

Quiet performance, great noise and plenty of cables.
Ref ID: 107260



SUBTOTAL: \$5292



Noctua NH-U12P

PRICE \$85

Two fans, quiet and nice overclocking capacity.
Issue 107, Page 48

CASE



Coolermaster ATCS 840

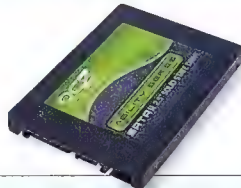
PRICE \$370

Heaps of fans, plenty of space, and dripping with quality.
Ref ID: 132479

OCZ Agility 120GB

PRICE \$555

Lightning-fast Indilinx controller speed for your OS and games.
Ref ID: 158083

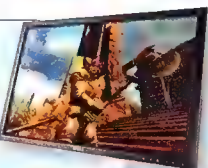


KEYBOARD

Microsoft Sidewinder X6

PRICE \$80

Backlit, sturdy, magnetic numpad & macro keys; what's not to like?
Ref ID: 129535



Dell 2408WFP

PRICE \$899

A huge 24in LCD screen for your prettiest pixels.
Issue 103, Page 57

MOUSE



Microsoft Sidewinder X8 Wireless

PRICE \$105

Cable-less, comfortable, lag-free and fraggable!
Ref ID: 148422

Logitech Z-5500D

PRICE \$425

Earth-shakingly good.
Issue 48, Page 56



Auzentech X-Fi Prelude

PRICE \$279

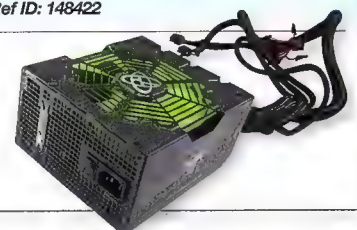
Best soundcard evar!
Ref ID: 112419

POWER SUPPLY

XFX 850W

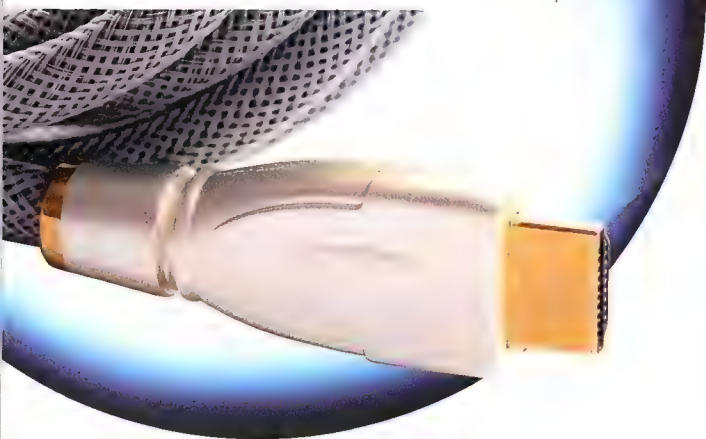
PRICE \$270

Plenty of power, ultra-stable rails and a great price.
Issue 107, Page 50



The **LAN Box**, the ultimate in portable gaming power – go anywhere, frag anyone. No longer will you be tied to a desk or forced to awkwardly manhandle your full-sized rig, helped by a convenient handle and beefy tech. Perfect for wowing people at LANs, the tech inside is fast enough to run any game, and boasts enough speed to keep your game running at full clip even if other programs intrude in the background. After all, no-one wants to miss a headshot.

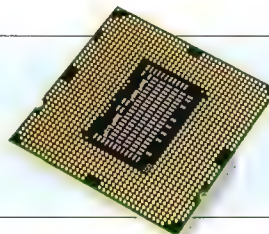
Graphics cards for HTPC rigs are always recommended in any serious build for the sheer flexibility they offer, but there's one extra thing they do well - HDMI for video and audio, at a price that is cheaper than most larger cards. While they can't really play games you won't need to – and HDMI will save you plenty of cabling headaches. Check out more about this spec here: <http://www.atomicmpc.com.au/?123699>



Finally, for the more entertainment-minded – and really, that's all of us – there's our **Home Theatre PC**, ready to play movies and music quietly and efficiently. It's got plenty of speed for video encoding while you're away, but makes very little noise thanks to the passive components used – even the heatsink can be dialed down to emit as much or as little noise as you want. Perfect for leaving next to the big-screen TV for all your media needs.

THE LAN BOX

CPU



Intel Core i5 750
PRICE \$240

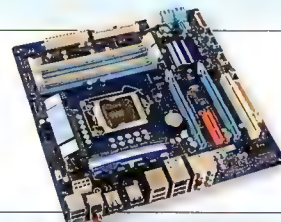
Intel's budget quad is more than you'll need in a chip!
Issue 106, Page 36

MOTHERBOARD

GIGABYTE P55M-UD4

PRICE \$195

Great overclockability, nice value.
Issue 107, Page 40



MEMORY



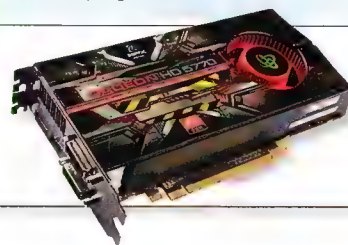
G.Skill Ripjaws 2000MHz
PRICE \$170

Great value memory with amazing overclocking.
Issue 106, Page 52

VIDEOCARD

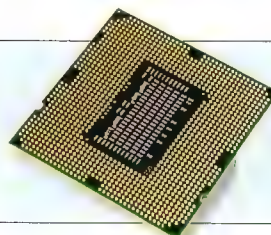
XFX 5770
PRICE \$218

A decent value way to get into DX11.
Issue 107, Page 47



THE HTPC

CPU



Intel Core i5 750
PRICE \$240

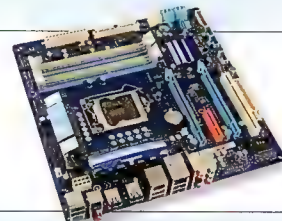
Plenty of power for HTPC duties, video encoding champ.
Issue 106, Page 36

MOTHERBOARD

GIGABYTE P55M-UD4

PRICE \$195

mATX form factor doesn't skimp on storage, or speed.
Issue 107, Page 40



MEMORY



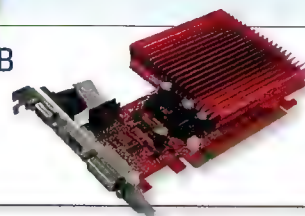
G.Skill Ripjaws 2000MHz
PRICE \$170

4GB of fast memory is plenty for running multiple HTPC media streaming apps.
Issue 106, Page 52

VIDEOCARD

Gainward G210 512MB
PRICE \$55

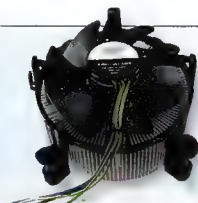
Perfect for Blu-Ray playback.



For more builds check out the Kitlog E-mag at atomicmpc.com.au/kitlog

SUBTOTAL: \$1656

COOLER



Intel Stock Cooler

PRICE FREE

Does the job, fits under PSU well.

CASE



Silverstone SG04

PRICE \$195

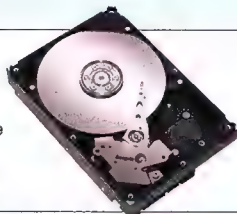
Small case with handle; add two 120mm fans for awesome cooling.
Ref ID: 148266

SYSTEM DRIVE

1TB HDD

PRICE \$90

A thousand gigabyte storage drive on the cheap.



KEYBOARD

Razer Arctosa

PRICE \$50

A cool-looking keyboard that'll serve you very well.
Ref ID: 149483



DISPLAY

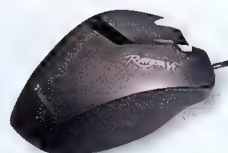


Viewsonic VX2233WM

PRICE \$199

21.5 inches of value-packed screen, great buy.
Issue 108, Page 42

MOUSE



Verbatim Rapier V1

PRICE \$65

Great gaming performance and nifty features.
Issue 96, Page 43

AUDIO

Plantronics Gamecom 777

PRICE \$94

Solid set of cans with great audio.
Issue 101, Page 41



Onboard Realtek ALC889A

A decent chip that does the job.

POWER SUPPLY

Corsair HX-520

PRICE \$140

Modular, efficient and keeps size manageable in cramped case.



SUBTOTAL: \$2366

COOLER



Scythe Big Shuriken

PRICE \$79

Tiny 58mm height, quieter than a sponge.

CASE



SilverStone Grandia GD04

PRICE \$155

Stylish exterior, 3x120mm filtered fans, 2x3.5" HDD space with plenty of room.
Issue 108, Page 47

SYSTEM DRIVE

Seagate Barracuda 1.5T

PRICE \$145

Fast, voluminous storage for all your prOn, videos and music.
Ref ID: 141622



KEYBOARD

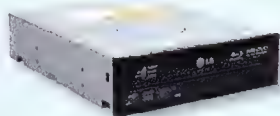
Logitech diNovo Edge

PRICE \$199

Wireless board with a trackpad for mousing.



OPTICAL

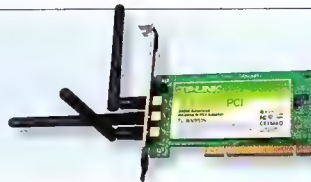


LG GGC-H20L

PRICE \$175

Bluray and HDDVD playback – best of both worlds

WIRELESS



TP-Link TL-WN951N

PRICE \$55

Zippy 802.11n for wireless HD video streaming.

AUDIO

Razer Mako 2.1 Speakers

PRICE \$469

Stylish tub-thumpers.
Ref ID: 126695



ASUS Xonar HDAV 1.3

PRICE \$279

Nice sound, expansion good.
Ref ID: 135112



POWER SUPPLY

Corsair HX-520

PRICE \$140

Modular and above all quiet for this whisper-soft build.



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Only roundup



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IT'S BACK
(& IT LOOKS LIKE THE
BEST PC SHOOTER EVER)

• PC Multiplayer details
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PLUS Atomic talks to real
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GAMEPLAY

Red Dead Redemption
Avatar: The Game
GTA Chinatown Wars
The Warcraft Anniversary
Metro 2033

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**BEST GAMING
GADGETS**
26 top gaming
gadgets to upgrade
your setup

**STAR TREK ONLINE IS
SET TO
STUN!**

THE NEW SCI-FI MMO THAT'S GOING
TO TAKE THE GENRE TO WARP SPEED

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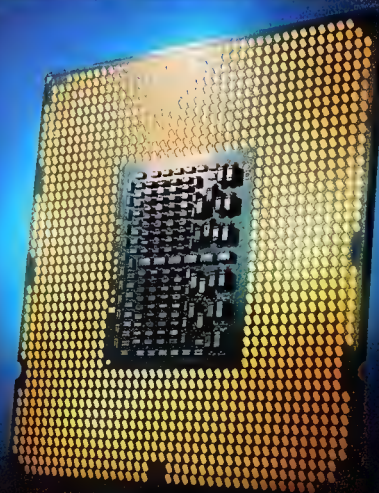
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TUTORIAL

HANDS-ON TUTORIALS FOR THE TECHNICALLY MINDED

Another month in the Tutorial section, and you'll probably notice something a little off-centre about it. Namely, the lack of an actual show-you-how-to-do-something tutorial.

However!

Being the stalwart (and attractive) people we are, we've asked Chris Taylor to dive into the gaming industry head-first, his favourite snorkel in town, to bring you the kind of info that you couldn't get even if you were

psychic. He's spoken with developers at Bluetongue and Firemint, each respectable Aussie companies, to find out what they like best about prospective employees.

It even turns out that working for them might not be quite as harrowing as you'd think!

And while Kitlog the e-magazine is still in Issue 2 form, as yet to pupate into the third issue, it's still a good read. Get to it!



TUTORIAL CONTENTS

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Chris Taylor chats to two Australian game developers about what it's like to work in the industry.



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Industry snapshot: Firemint and Bluetongue



Chris Taylor speaks with two Aussie game developers.

Last month we brought you a brief overview of the current state of the games development industry in Australia. As writers for a gaming and tech magazine, it's in our interest to keep an eye on things. As prospective members of the games development industry, it's also in your interest to keep an eye on things. As it stands, there are more specialised games development courses on offer now than ever at universities, TAFE institutes and private providers like AIE and QANTM. Unfortunately, such qualifications come with no guarantee of employment within the games development industry. Times are tough. Some large developers have shed staff. Some simply aren't hiring. Our report looked at the games development industry as a whole: the courses, the employment prospects, the studios currently doing business on our shores. This month we zoom in.

We've spoken to representatives from two Melbourne-based games development companies: Firemint (www.firemint.com) and Bluetongue (bluetongue.com). The former has developed a number of titles, based on both licensed and original intellectual property, for mobile platforms and Game Boy Advance. The latter you may know from the Wii puzzler *de Blob*.

What qualities do employers look for?

So far as Kevin Chan, Bluetongue's general manager, is concerned, "the most important thing is a passion for making games. We look for people who love to think critically about games and who also have a wide variety of other interests as well. Good communication skills are critical. A development team is an interesting mix including production, programming, art, audio and design. So, it's important for team members to understand the issues that other team members are tackling and be able to work effectively with people who may have very different backgrounds [and] skill sets. We also look for people who are never content with their abilities and who are always working to improve their skills [and] knowledge. It's the only way to keep raising the quality bar."

The ability to think critically about games is an oft-overlooked skill. It's not enough for an aspiring games developer to simply enjoy playing games, although that is certainly important. He or she should be able to look at a game and determine what makes it good or bad, entertaining or boring. How could it be improved? Why were the levels, weapons and tracks designed the way they were? When you next play a game,

whether it's a commercial title or one you're working on yourself with a view to padding out your portfolio, ask yourself these questions. Dissect the game into its constituent parts and consider how they all come together.

The response from Firemint came, "We look for someone who is highly talented in their chosen area, who has specialised in that area and can demonstrate their skill: either through shipped titles or a portfolio of personal work that they have completed in their own time. For graduates, it can be difficult to [assess] their skills by looking at a group project, so we really love to see individual work alongside games they have worked on as part of their course. This is also a great signal that they are really engaged with the industry and are passionate about making games. Finally, it's really important that the prospective employee is a good fit with our company culture, so we need to figure out whether they will love what we are doing as much as we do." Their advice, we hope, echoes what we've said in the past. Having the initiative to develop a game or mod in your own time, either on your own or with a person skilled in a complimentary area (modelling, say, if you're purely a programmer), is a very good thing.

Developing your written and verbal communication skills, too, is important. Indeed, if you're about to begin or currently attend university, you should make the effort to fit a few communication units into your schedule.

What do employers think about games development qualifications?

"There are some good courses out there," said Chan. "However, [we] don't think people should rule themselves out if they have a more traditional tertiary degree. Ultimately, the most important thing is having a great portfolio of work to show." A more traditional degree, in this case, would be one in computer science or arts (majoring in multimedia, perhaps). Firemint makes the same argument. "We value tertiary education highly, but it doesn't have to be games focused. For example, for aspiring engine programmers we value hardcore, high-end mathematics and engineering training the most, so we look for that ability irrespective of where it was gained. Completing a games course is a great sign that the person is serious about working in the industry, and the courses can also be helpful in



de Blob by Blue Tongue Entertainment.

putting together a relevant portfolio, but we'd be just as happy hiring someone from a non-games course who can demonstrate the same skills through a great demo. Our perfect candidate has performed well in a rigorous degree and also produced their own portfolio. In the case of hiring artists, portfolio is even more relevant."

What do developers think about projects developed in the applicant's own time?

Bluetongue regards independently developed products as "really helpful", Chan explained, "We always take a closer look at applicants who have mods [or] demos in their folios. These kinds of projects are a great way for the applicant to show off the skills they can bring to the team and let us know that the applicant has an understanding of what it takes to put a game together. The people who have mods and demos to show are usually the applicants who are passionate about creating games." The representative from Firemint said, "If someone comes to us with a game that they have made on their own and that game is finished, polished and fun, they would be very seriously considered. The demonstrated ability to finish a good game on your own trumps almost everything else. The game doesn't have to be elaborate, either: it can be very simple and small in scope. Mods are also good, but don't carry quite as much weight as a complete game [developed] from scratch. But we certainly

consider [mods] for designers and artists."

It is natural for the newcomer to want to impress everyone, but especially himself or herself, with something epic in scope: the next *Crysis* or *Grand Theft Auto*. There is a reason why such large-scale games, the sort you pay in the realm of \$100 for, are developed by very large teams with very large amounts of money to throw around. If your idea is too large, you'll find it very difficult as one person to realise it, let alone make it shine. A puzzler, platformer or side-scroller may not seem impressive on paper, but if it's visually attractive, engaging and addictive, you're bound to turn heads.

What surprises newcomers to the games development industry?

"I think new graduates are sometimes surprised at the scale of commercial projects", said Chan. "The amount of code and assets provided is often much greater than mod or demo projects that they've had experience with. They can no longer have their head around everything in the project and need to communicate and coordinate a lot more with production and other members of the team. Some newcomers are also surprised with the level of talent they meet in the industry. I've had comments from new team members saying

that they were impressed with how much they learnt as they worked with existing members of the team." In response to this question, Firemint sent someone around the office, seeking responses from those hired as graduates. "I thought they were joking when they told us 95% of game developers are male. Surprisingly, it usually doesn't smell too bad around here." "I was surprised how casual and friendly everyone was and how small the teams were. I think I was expecting some kind of huge, Dilbert-like cubicle maze." "I used to imagine workplaces to be dark,

scary things where everyone was overly stern and serious. I'm glad I was wrong."

Kudos

We would like to thank Firemint's Alexandra Peters and THQ's Paul Houlihan for giving us the opportunity to speak to people at Firemint and Bluetongue respectively. Their insight will no doubt prove valuable to those readers seeking employment in the games industry. At the time of writing, both Firemint and Bluetongue were advertising vacant positions on their websites. 

Firemint's Real Racing for the iPhone.



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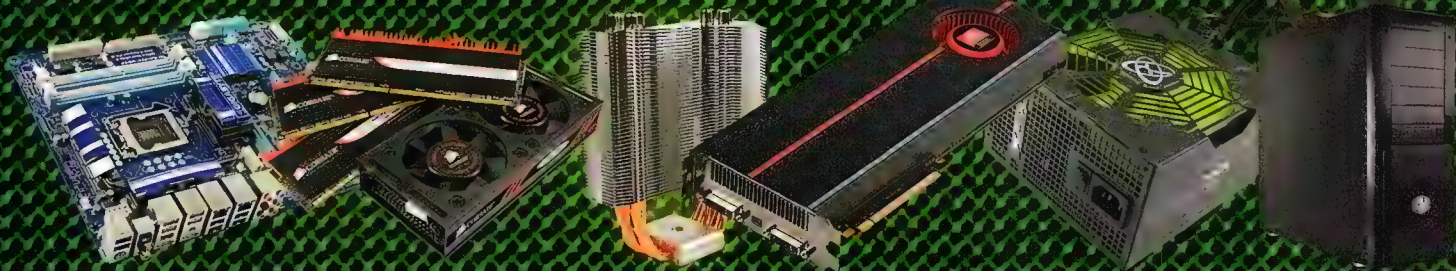
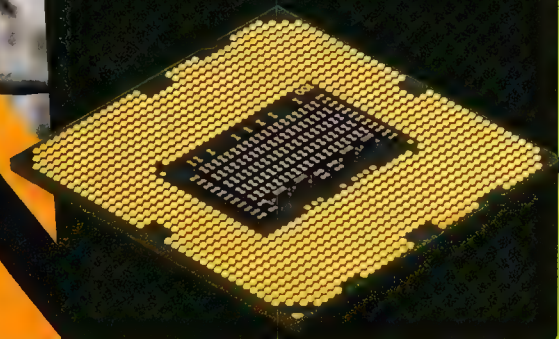
Issue 2, January 2010

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GAMEPLAY

GAMES, GAMING AND FILM COVERED... ATOMIC-STYLE

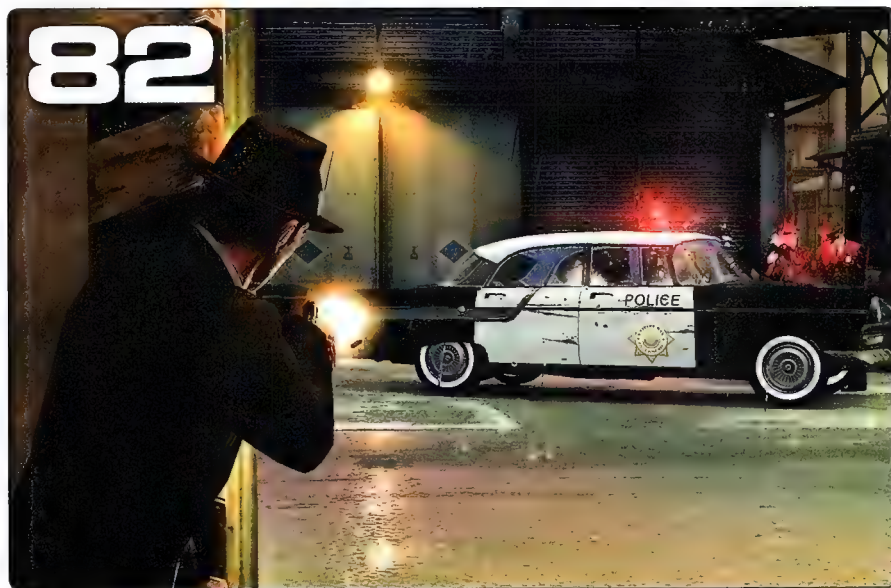
Say hello to our little friend; Mafia II. It's a gem of a game that has inspired thousands of would-be mobsters all over the world, giving them a purpose and an outlet for their decidedly Sicilian dreams. We've had a chinwag with the developers of the game, delving as deeply as our Engine Rooms usually manage, and the game is shaping up nicely.

We've also beamed ourselves directly into Star Trek Online, and while the end result is perhaps as refined as a Klingon on a pub crawl, it's still about as much fun. Mass Effect 2 has hit, following on from the original title with so many changes, you'll be hard pressed to know them all! AvP has also been played, and we've survived the onslaught in the usual Atomic style.

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MAFIA II

David Hollingworth speaks to 2K Games about their latest mobster-filled title.

Since the original *Mafia: The City of Lost Heaven* game was released in 2002, and later re-released for consoles in 2004, 2K Games has enjoyed great success. The popularity of the first game was undeniable, with the rich 1930s-era world proving attractive enough to re-enter the lovable American-Italian world with development of a sequel announced in late 2007. We've had a chance to chat with 2K Czech, the developer of the game, about just that, so pick up your violin case and read on.

atomic Mafia II is already looking like a big game. What specific areas did you want to nail, and improve upon, compared to the original?

2K: There are many areas of the game that we wanted to overhaul and improve. The key element to Mafia II is the cinematic mobster experience, with really believable characters and a compelling narrative. It was already amazing in the first game but even still we set ourselves a very high goal of improving upon that.

Another area that really sticks out for us is the gun combat in the game. This element has received a huge overhaul as far as the original Mafia is concerned, and actually any other open

world game. We looked more towards third-person action games for the mechanics that are used in Mafia II; we make use of a cover system, we don't have a targeting system where you can just bounce from one enemy to the next, and the environments that the fights take place in are

really spectacular – not only in the way they look, but in the way they come apart. The amount of destructible objects in these locations really is outstanding for a game world with the scope of Mafia II.





...we've spent a hell of a lot of time on our technology, really pushing the boundaries of what each platform can achieve.

atomic Your in-house engine offers a lot of physics processing and effects, but how will that scale across the three platforms you're releasing on? And what is your favourite platform to play the game on?

2K: The Mafia II development, from day 1, has been platform agnostic in controls, accessibility and in the actual content that gamers will experience. At 2K Czech we've spent a hell of a lot of time on our technology, really pushing the boundaries of what each platform can achieve. We think that no matter what platform you choose, when you compare it to other titles on that same platform you are going to be blown away by the technical and artistic achievement.

atomic And, most importantly for PC users, will there be more detail and effects that owners of high-end hardware can enable?

2K: Yes, there will be for sure. The PC allows us to do extra special little things that the consoles might not be able to do, but ultimately the gaming experience is the same on each platform, although there may be a higher number of bells and whistles on the PC.

atomic How open is the story going to be in Mafia II? Is it a linear progression, or are there different end points the player can



reach? What kind of choices will players be presented with?

2K: The story in Mafia II is a completely linear experience. We wanted to create a really strong and compelling narrative with the game, which is very important to our core experience; a storyline that really drags the player through the game with great intensity. We played with different ideas and concepts but ultimately to achieve this goal that we set for ourselves, we felt that we had to make some tough choices and create a linear progression story. I think the final quality speaks for itself - we made the right decision.





atomic The action and gunfights seem pretty spectacular in the game – do you ever worry about balancing that kind of action with telling an interesting story?

2K: Absolutely! We have this whole mantra that in each small five minute period the player should behave like a Mafia guy in the 1940/50s. We didn't want you going off on some massive kill crazy rampage with a bazooka, as that doesn't fit our fiction. What we do however is make sure that any gun fight you do get involved in is an intense and visceral experience: glass smashing around you, bullets ricocheting off walls, enemies dodging in and out of cover et cetera. It looks and feels hugely spectacular but still it's quite a realistic level of action.



The story spans a decade, features over 300 speaking characters and is scored by the Prague Philharmonic...

atomic How open will Empire Bay be? Are there lots of side-missions and hidden content for players to explore?

2K: Empire Bay is pretty huge; the playable area is around 10 square miles. The focus of Mafia II is very much on the cinematic shootouts and car chases but the city backdrop is still a fun and interesting place to be. There are 20 city districts, each with their own vibe and style of architecture, enemy gangsters roaming the streets, many beautifully rendered shops, diners and bars, over 50 vehicles that the player can 'acquire' and personalise and, of course, the police are always present to react to your misdeeds.

atomic With a character name like Vito, your inspiration is pretty obvious – but what other films have you looked at for inspiration? How about books, or real historical figures?

2K: There's a very wide range of inspirational

works for the game: crime movies, period music, pulp novels, even 1940s wedding catalogs! Our goal has always been to deliver an experience where the players feel like they are playing through an epic mob movie. The story spans a decade, features over 300 speaking characters and is scored by the Prague Philharmonic so, I think you get the idea that the story and presentation here is going to blow you away. Obviously The Godfather is the mob-movie figurehead, but actually that film is quite different in its direction, at least from the story we are trying to tell. We didn't want to go down the route of portraying mafioso as honorable criminals in tuxedos. We are far more interested in the wise guys not the dons. Our story is about the soldiers rather than the bosses, so we're much closer in tone to Goodfellas in this respect, I think.

atomic Gangster stories like this are often very moral tales, and often strive to show that crime in fact doesn't pay – are you taking a similar story-telling tack?

2K: They are very moral tales and I think that's why we like them. There is, clearly, this fantasy element of being a complete and utter bad ass but underneath it all the actual





with this in two ways: first, our fictional story is actually a tragedy. Yes, our story charts Vito's rise in a life of organised crime but things start to come unstuck for him; things aren't all they're cracked up to be.

In gameplay terms, the way we deal with it is to have a pretty tough police system; if you commit a crime in our city then, much like in real life, the police will come after you – and harshly too! You cannot just rampage through Empire Bay and get away with it.

atomic Finally, the question that has to be asked – what's your favourite gangster movie? And why?

2K: Tough question, but it has to be Goodfellas;

so many great performances and the direction and writing was a once in a life time deal, which doesn't happen very often. The real reason we love it is for the story, of course. Mafia is a romantic imagining of the The Godfather story and it was good, don't get us wrong, but we find Goodfellas more believable, more human. An honorable mention has to go to Sopranos as well. To us, it's quite simply the best TV show ever made.

atomic Thanks for your time. 

people and stories are quite human. Sopranos is a great example of this; the show was as much about the Mafia as it was about Tony Soprano's family trials.

Anyway, a little off track there... we deal with glamorisation of crime for sure and we deal



MODIFICATION

with Ashton 'For the love of Mod' Mills



Gothic 3 Community Patch

Game Gothic 3

URL www.g3cpt.eu

Few games get as much loving attention from modders as Gothic 3 has had. The Gothic 3 Community Patch 1.73 is a passionately crafted update to Gothic 3 that makes some 1200 changes to the game including graphic, balance, and AI changes. It's worth noting that JoWood, the publishers, helped out by actually providing source code to the game. This allowed the development of features such as adding HDR rendering, soft particles, new shaders and 'Rim lighting' highlighting the edges of objects. Along with higher-resolution textures, the patch helps Gothic 3 keep up with its modern counterparts.

And while the engine does show its age in some areas – certainly not helped by menus that look they were made on a Commodore 64 – there's still something beautiful and charming about it, and with the community patch it is in many ways more graphically appealing than some modern titles.

Same goes for its gameplay. In Gothic 3 you can see inside and enter buildings seamlessly without loading screens (here's looking at you Fallout 3) and do things like scale down cliff faces and run along roofs, not to mention explore the world in any direction. It's kind of the antithesis to Dragon Age: Origins in terms of freedom, and it's brilliant.

The patch is, according to its homepage, the last instalment. So it's fair to say this is as good as it gets for Gothic 3. If you loved the original game, or got the game cheap in a Steam sale, install the Community Patch before playing as it'll greatly enhance the game. And as a testament to how lovingly crafted it is, it even comes with its own 22-page PDF manual detailing the changes complete with screenshots.



Galactic Warfare Beta

Game Call of Duty 4
URL www.blackmonkeys.de

Star Wars. Two words that are catnip to most any geek, and the pronunciation of which can cause strange groinal stirrings for the more hardcore fans among us. In short, you can't usually go wrong tagging 'Star' and 'Wars' anywhere in the one sentence.

Call of Duty 4. A game synonymous with synonymity, multiplayer on a level of awesome, and franchise milking at an epic scale – but with good reason. The COD games are all classics and none more so than COD4.

So what happens when you combine the two? What happens indeed – for few could surely stand against the power of such a joining. But you can find out for yourself – head to www.moddb.com/mods/star-wars-mod-galactic-warfare to download Galactic Warfare and join the ranks of the rebels or the empire and feel the thrill of wasting your friends Star Wars style among the streets of Mos Eisley.

Is it a good re-creation? So far so good. Not only does it look great, but running on COD4's engine it also runs smooth and, aside from variety and type of weapons, combat is similar (except fire fights take you back to those like in the movies!). But as a beta it's not yet complete.

There's just one map in the beta, but more are on the way. While there are still more character models to come, you get to choose



one of four classes on either side: assault, specops, heavy gunner and sniper. Naturally there's a range of classic weaponry for you to play with including (let's see how well you know your lore) the A280 blaster rifle, DLT-20A blaster rifle, T21 repeating laser, DH17 blaster pistol, E11 blaster, and the Tuskan Rifle. Again, there will be more to come in subsequent releases (including Chewbacca's bowcaster and Boba Fett's EE-3).

It may be a while before it reaches 1.0



PATCH notes

The month's essential patches.



Atlantica Online Patch v21406 to v21505

AussieLife Patch v1 for Arma 2

Star Wars Force Unleashed Ultimate Sith Edition Patch v1.1

DCS: Black Shark Patch v1.0.1c

Forgotten Hope Mod Patch v2.2 to v2.25 for Battlefield 2

Arma 2 Patch v1.05

Wolfenstein Dedicated Server Patch v1.2

Wolfenstein Patch v1.2

Advanced Warfare 2 Patch Build v4.20

World of Warcraft Hotfix Patch v3.3.0 to v3.3.0a [US/AU]

status, but don't let that stop you from re-living childhood memories. There aren't many servers about yet, but there are some. Head to www.game-monitor.com and search on 'mp_tatooine', or host your own. ☺





Star Trek Online

Does this game boldly go, or just blow?

It's kind of hard to review Star Trek Online objectively.

When you're the sort of kid who grew up watching Original Series re-runs, whose eyes boggled at the spectacle of The Motion Picture, and cried when Spock died, well, being able to sit back and even-handedly critique anything to do with Trek is a tough call.

But we'll do our best to not be blinded by the shiny starships and that oh-so familiar and beloved theme music.

Further, as of writing, the game is going from closed to open beta, and a lot of basic mechanics and systems are still being tweaked. Even the devs have admitted that the game will technically not be 'complete' at launch. Like Warhammer Online (though, hopefully without the dramatically plummeting player-base and server issues), Cryptic Studios seems happy to admit they've bitten off more than they can chew, and that a large content patch will be applied to the game a month or so after launch.

But, that said, there's still a lot of game in place, and more than enough to get an idea of what Star Trek Online offers to the MMO marketplace.

Boldly tweaking your cheekbones

The first port of call in any MMO is character creation, and even at this early stage, Cryptic's breaking molds. Not only can you choose amongst a range of pre-statted races (from

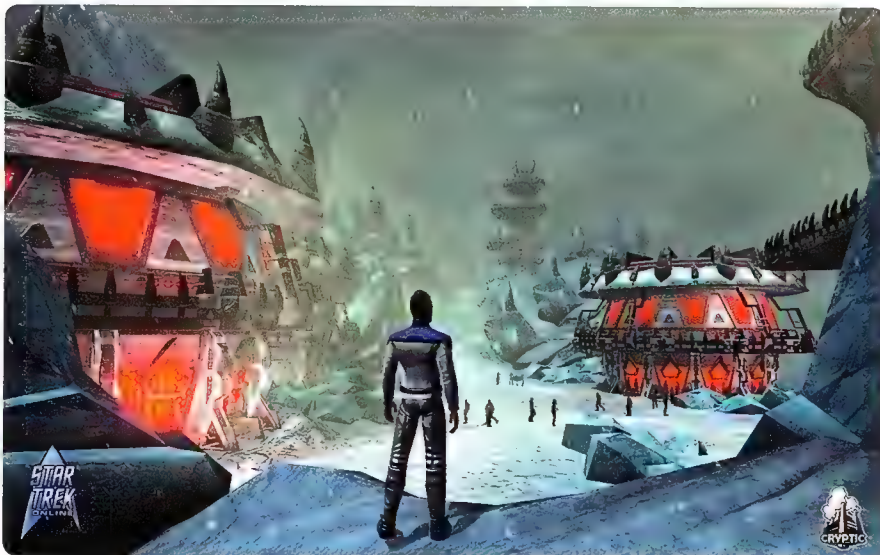
human to Vulcan and a mess in between), but you can also go all out creating your own latex-foreheaded species. Like Cryptic's previous effort, Champions Online, this is a lot of fun, and even messing about with a plain old human the aesthetic options are very deep.

There's also a range of different uniform types to choose from, so even from the get-go you'll have an individual who looks the part of a Starfleet officer, but still stands out from the pack.

Apart from looks, you get to choose a couple of traits to go alongside your base racial ones

— for instance, humans are good at Teamwork, and you can further add skills like simple martial arts moves of bonuses to certain kinds of ship combat. It's not much, but it's more than a lot of MMOs offer.

Naming is pretty impressive, too — you can choose not only the simple name your officer will be known as, but you can also fill in a complete biography at this stage, as well as a longer formal name. So, for our toon, we're generally known as Officer Grant, but those who care to know can find out our full name is William



T. Grant, and that he's a descendant of the American Civil War general of the same name.

It's the kind of detail that will really please the carebear roleplayers.

The most important part of character creation though is choosing what branch of the fleet you've been trained up in. Tactical Officers are your classic combat characters, deadly both in space and on the ground. Science Officers offer special buffing and debuffing skills, while Engineering Officers are better at keeping their ship's operating at peak form.

And your training badguy is... ... the Borg!

That's right – as you begin play you'll get a series of missions that introduce you to the game's basic mechanics, and the protagonist is the mighty Borg Collective, as they attack the Federation Colony of Vega.

The sequence is a good intro – you get some basic ground combat, some simple ship-based missions, and get introduced to your first bridge officer – more on that later. At the end of it, you also get a promotion from Ensign up to Lieutenant, and your first command, a Light Cruiser that you choose from one of three aesthetically different but technically identical ship classes. You can even mix and match the various parts (saucer, pylons etc) to make your own design – the customisation this early on is pretty impressive. Most games make you wait tens of levels to unlock this kind of tweaking.



The early levels are a good introduction to the game, but even still there's a lot more to learn in STO. One big difference is the amount of skills you'll have to balance in even the early levels, especially in space combat.

The basic mechanic in STO is that your character – a young Captain (see the boxout) in his first command – is not the final word on what skills you have access to as a player. Your Bridge Officers flesh out a lot of your functionality, each bringing their own unique skills to the game.

You'll have three crew slots to fill on your bridge – one each for Science, Tactical and

Engineering. So, with your own unique space or ground skill, that's four unique powers to balance from the get-go; like your own specialisations, Tactical Officers boost combat skills, Science Officers open up neat tricks with your deflectors and sensors, and Engineers can help keep your ship in one piece. Each Officer also has a unique ground ability that maps similarly to their space-based ones, except that Science Officers often end up as healers.

And you're never alone on ground missions, either. If you're soloing, your Away team is made up of whatever Bridge Officers you want to





join you, and the rest of the five-person team made up by Security Officers – the ubiquitous, dispensable Redshirts we know and love.

New Officers can be requisitioned at Starbases, or rewarded for completed missions. As there's a range of skills for each slot, you can very easily customise your crew to work how you want it to, and this opens up a lot of flexibility for creating a ship that operates outside of the usually strict bounds of Tank, DPS and Buffer.

Lock on all phasers!

More than anything else in the game, you'll be dodging Klingon Birds of Prey and tangling with Orion Pirates a lot, so mastering space combat is essential. In fact, there's so much combat that it's almost too much – Star Trek is all about peace and love as much as it's about photon

torpedoes. The extra combat is justified by a new war with the Klingon Empire (so much for Khitomer), and every other galactically involved race has decided they want in on the action.

If you've ever played any of the Starfleet Command games, you'll have an idea of how combat plays out in STO. The devs have always said they were aiming for that Wrath of Khan feel, and, largely, they've gotten it right. The WASD keys control your vessel, and an array of keys map to phasers, torps and cannon. For instance, the Light Cruiser that every players starts with, and will be kitting out for the first ten levels, has two forward hardpoints and one rear; the stock loadout is a phaser and torpedo tube front, and a phaser rear, but you can mix and match this with purchased upgrades or gear salvaged from destroyed foes.

Each kind of weapon has a different arc, too.

Your typical phaser mount has a 250 degree arc, while torpedoes are limited to 45 degrees, and other weapons vary considerably. So, looking at our light cruiser, you end up with a sweetspot that can let you pummel ships with both phaser mounts – but you won't be able to use your torp.

You also need to keep in mind that some weapons are good at depleting shields, while others excel at damaging un-protected hulls – typically, torpedoes are the game's shipkillers. In game this leads to tense phaser duels, with quick surgical torpedo strikes once you manage to drop an enemy ship's shields – though as a shield has four facings, it's possible to quickly maneuver to interpose working shields and protect vulnerable facings.

Space combat in STO is longer than in many MMOs, but that suits Trek canon perfectly. There's also a lot more skill involved in co-ordinating not only the vectoring of your ship, but also timing attacks and powering special abilities, such as using a Tactical Officer's High Yield Torpedo skill. The amount of fighting you need to do in STO can get a little dull, but you also end up with the occasional space battle that is truly epic, and utterly rewarding in a way that no other MMO (except, perhaps, for Pirates of the Burning Sea) can match.

The space combat gets even better – and looks more spectacular – when you get together with a bunch of other ship Captains. Here, some of the Science skills really start to come into their own, such as the ability to transfer shield power between two ships.

Ground combat, though, while still somewhat more tactically complex than a lot of other games, still feels like space combat's poorer, dumber cousin. This isn't helped by the





character animation, either – space combat is elegant and beautiful, while watching your away team get stuck on ferns, dance like Egyptians, and run back and forth is anything but.

It's a shame, because again, a lot of thought has been put into the way an away team works together, and some of the missions have neat challenges. Science officers can heal or de-buff, Tactical Officers get neat offensive skills, and every weapon has neat primary and secondary firing modes – but the stuttery animation is a real immersion breaker.

For meritorious service...

Apart from disintegrating Klingons and scanning special anomalies, character progression is the other thing you'll be pondering a lot of in STO.

In a welcome break, Cryptic's gone with another unique take on levelling. Rather than getting to improve skills each time you level, in STO you'll only level once you've earned enough skill points, which you get for completing quests and defeating enemies. This means skill increases happen slowly over time, rather than in big jumps, and new skills open up in every tier, or block of ten levels.

The same is true for your Bridge Officers, and levelling their skills is just as important. Boosting your own skill level in different skills can also unlock new combat abilities, so there's always something to work toward.

However, the most important aspect of moving



through the tiers is unlocking new starships.

Everyone starts out with an identical Light Cruiser, but once you get promoted to Lieutenant Commander you can start focusing not only your skills, but the craft you'll be using as well. Vessels are broken up into three broad classes – Escort (small and fast, with good firepower, like the Defiant from DS9), Cruisers (big crew and energy reserves, like any of the Enterprises), and Science vessels (good with auxiliary skills like sensors and buffing). These of course map somewhat to your own Captain's specialisation, but there's nothing stopping a Captain with a Science background from choosing an Escort.

With each of the five tiers, new and more powerful ships open up, all the way to mighty vessels like the Sovereign class Cruiser (the same class that the Enterprise E is).

Once again, we applaud this open design, and with so many ships to choose from, and even the choice between holding on to a well-equipped lower-tier vessel rather than upgrade to a 'stock' higher-tier one makes for some interesting character development. The vessel designs are based on a mix of established

classes seen in the various films and new classes seen in STO for the first time – picking a ship that both performs as you wish, and looks the part, should not be a problem.

Where no one has gone before

This is undoubtedly a big game, and a big gamble on the part of Cryptic. Champions Online was not a smooth launch at all, and many – like us – believe it's simply not a good game. However, there's really only one simple metric for an MMO: having logged off, are you counting the hours before you can log in again?

Well, we certainly are – at time of writing our level 7 Lieutenant is about to be wiped from the servers as the game switches to open beta, but even the prospect of starting again, and exploring new options, is exciting. All that we can hope is that Cryptic can continue to polish this game through to launch and beyond, but even in its current state, Star Trek Online is a compelling and thoroughly unique experience. **DH**



PC

Developer Cryptic Studios
Publisher Namco Bandai
Website www.startrekonline.com

Graphics
Great space combat, but let down by poor character animation on ground.

79

Gameplay
Rich and varied levelling, though missions can get repetitive.

88

Sound
Pew pew! Lots of recognisable effects from the show.

81

Overall
There's a lot of room for improvement, but we're still having fun.

82%



Aliens vs Predator

Ping... ping... ping... PING! "We've got movement!!!!"

Seriously – who thought the motion tracker was helpful on the battlefield?

I mean, it's a device that tells you, every now and then in the most fear-inducing tone possible, that a bad guy is somewhere over that-a-way. Really? There are bad guys here? Well, d'uh! Why else would an elite unite of Colonial Marines be deployed?!? It's a serious design failure – all the motion tracker is good for is making poor marines shit their pants whether they're going up against a terrifying xenomorph, or a swinging door.

And, frankly, we wouldn't have it any other way. Sega's new AVP is set to bring that wonderful fear in spades, and it seems the only thing that it doesn't give – is a fresh pair of pants.

Three times a charm

The road to this new Aliens Vs Predator has been a little rough, but we're glad to say that the machinations don't look to have hurt the final product any. Our preview code featured three Marine levels, and both the training levels for the Xenomorph and Predator species, and there's a lot of unique gaming in each of them.

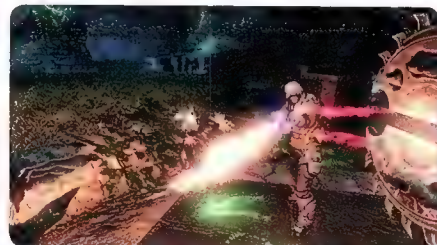
For those who remember the last AVP game (also developed by Rebellion, back in 1999), this new one isn't quite so deliberately paced, nor quite as atmospheric. The '99 release didn't even let you see a xenomorph until well into the game, but Rebellion's latest effort wastes little time

getting the Marine player hip-deep in bug.

The campaign starts pretty much as you'd expect – a Weyland-Yutani expedition is meddling with shit they shouldn't, and all hell (ie, bugs and predators) breaks loose, requiring a Marine unit to clean things up. Of course, they get caught in the crossfire, their troop ship gets taken out, and as the game begins you've only survived because you were wounded in the drop, with your unit either in pieces or split up all over the colony.

It's a solid introduction, and it ramps you up through different weapons and situations pretty well, with a lot of scripted sequences along the way to really show you how screwed you are, like one great bit where you, a fellow marine, and two automated defence guns must hold off a chattering horde, before you fall back to an elevator that seems like it'll never arrive in time.

Everything's there – the awesome foley on the pulse rifles, the stop-start insectoid motion of the aliens (and rag doll physics really work with these spindly guys), and the all important musical cues from both Alien and Aliens. The sense of fear and impending swarmination (it's a real word!) is really solid, but there just seems something slightly





off about the marine missions – in particular, the ballistics of all your high-tech shootin' irons. They all seem just a touch too inaccurate, and it'll often take two or three bursts to bring down a single alien. What this does is make just one or two bugs seem like a real challenge, when really – we feel – single bugs shouldn't be a problem for a well-armed marine. It's the xenomorph's numbers that should be providing difficulty, but *Rebellion* seems to be going out of the way to try and keep such challenges back.

Of course, this is preview code, so both those issues may be addressed in final release. And, rest assured, it's still scary fun to play, but just not quite the same level of perfection that *Rebellion* nailed the first time around.

We blame the console market.

Facehuggers, xenomorphs and predators – oh my!

Things seem much more on-song in the other two single-player campaigns.

In the *Xenomorph* campaign, we're treated to just what some of the nasty research is that

Weyland-Yutani's been financing – weaponising aliens. In a scene very reminiscent of *Aliens IV*, we get to see some poor mopes birthing chest-bursters, and we meet one in particular who's cunning enough to draw the attention of the chief scientist. Fast forward one life cycle and subject six (after the numeral etched into your big bug head) is being put through its paces.

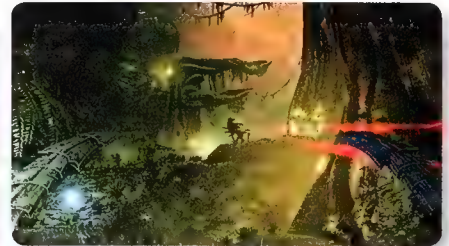
And by paces we mean slaughtering more poor test subjects.

It's actually blackly amusing, especially once you kill the lights (a quick strike with your tail), and a bumbling electrician is called in – surely that's a case for *Union* action if ever we've seen one.

Inevitably, you break out, bringing around an onset of sneaking, pouncing, face-biting, and wall-running to the compound, fighting your way to freedom for you and your fellow test subjects.

Once again, the *Xenomorph* plays like an insane bouncing thing with no regard to up or down, and special talent for healing through eating heads. It's a lot of fun.

The *Predator*, on the other hand, is all about carefully applied power. Whether it be blocking xenomorph attacks with twin wrist-blades, or carefully locking on to targets with a powerful plasma weapon, the pred is a stalker, carefully



tracking and trading blows with an enemy before taking it out – and then taking a trophy. Storywise, you're a young predator yet to earn his hunting stripes, but we suspect you'll be top of the hunting heap by the campaign's end.

Both campaigns have remarkably different feels, and even entire game mechanics that differ from the human story, whether it be the predator's ability to lock onto a point and jump huge distances on a map, or the alien's ability to sniff out enemies; we've not seen multiplayer yet, but we hope all of this will make for some very tense firefights and claw-fests. *DirectX11* is also supported for those lucky enough to have it.

Still can't stand that motion tracker, though.

DH

(PC, Xbox 360, PS3) Previewed on PC

Developer: Rebellion
Publisher: Sega
Website: www.sega.com/games/aliens-vs-predator/

✓ Visceral gameplay; awesome atmosphere; great alien on alien action.

✗ Somewhat wishy-washy Marine controls; not to be played in the dark.

Anticipation rating
Hell – we're just happy it's getting a release at all!

79%





Mass Effect 2



The crew of the Normandy are back for another round of saving the universe...

Let's get the rampant adoration out of the way right now – Mass Effect 2 is quite possibly the Game of the Year. Yes, we have many months to go, and there's a lot of great titles coming down the pipe. But we simply can't imagine any other game delivering the same smooth, slick, and immensely satisfying blend of action and storytelling that ME2 does. What's more, it's that rarest of rare eggs, the sequel that both honours the original, and in many ways surpasses it.

Truly, it is the Empire Strikes Back of games. Also, we lied – expect a lot more adoration ahead.

In Media Res

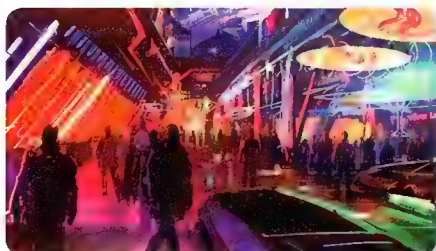
In a game that's all about story and plot twists, it would be poor form to be too spoilery, so we'll do our best to keep things concise without giving away any major plot points, especially some of the early eye openers. But rest assured, ME2 starts with a hell of a bang, and throws

you straight into the deep end of an ongoing investigation into a mysterious series of attacks on human colonies.

In between recruiting your new team (and there are some old faces amongst them), and making these initial inquiries, you also get a generous re-introduction to the Mass Effect milieu – and we'll say it now: you really owe it to yourself to make sure you've completed the first game, as the integration of the new title with your old completed save is nothing short of stunning.

Any allies who died in the first will stay dead;

decisions made (or not made), will have a lasting effect on the shape of the game, and as you travel the stars you'll be reminded more than once of your past deeds. More than any other second game in a series, this feels fundamentally fluid. And yet, because of the... interesting circumstances of the game's opening plotting, you can bring back your old character, while still getting a chance to mess around with their looks and class. Played a Soldier first time around, but feel like messing about with Biotics this time? Not a problem, and it's elegantly written into the story.





Your old character level is brought into play, as well, though only providing a one level boost at the game's start, though it must be said that the drop from high-level arse kicker down to first level noob is actually not at all jarring, thanks to the radically re-tooled character mechanics.

Elegant in its simplicity

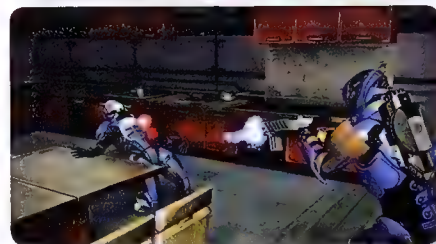
A lot of early reviews are saying that BioWare has stripped out a lot of the RPG elements in ME2, and in terms of straight up western PC RPGs, there's an element of truth to that. One of the big complaints about the original was the clunky inventory system, which quickly got clogged with useless weapon upgrades and underpowered weapons and armour. The subsequent PC release did a lot to fix that, but

it was still something best left ignored, and woe betide anyone actually trying to sell something, or convert stuff to Omnigel.

In ME2, though, that's all gone, almost literally.

There is no inventory. Instead, as you find new weapons, they become available to everyone who can use them – this is a post scarcity economy after all! Similarly, upgrades are a simple matter of finding enough raw materials (scattered throughout each area, and in unexplored star systems), then committing to the research – and again, all upgrades propagate through all relevant weapons and characters.

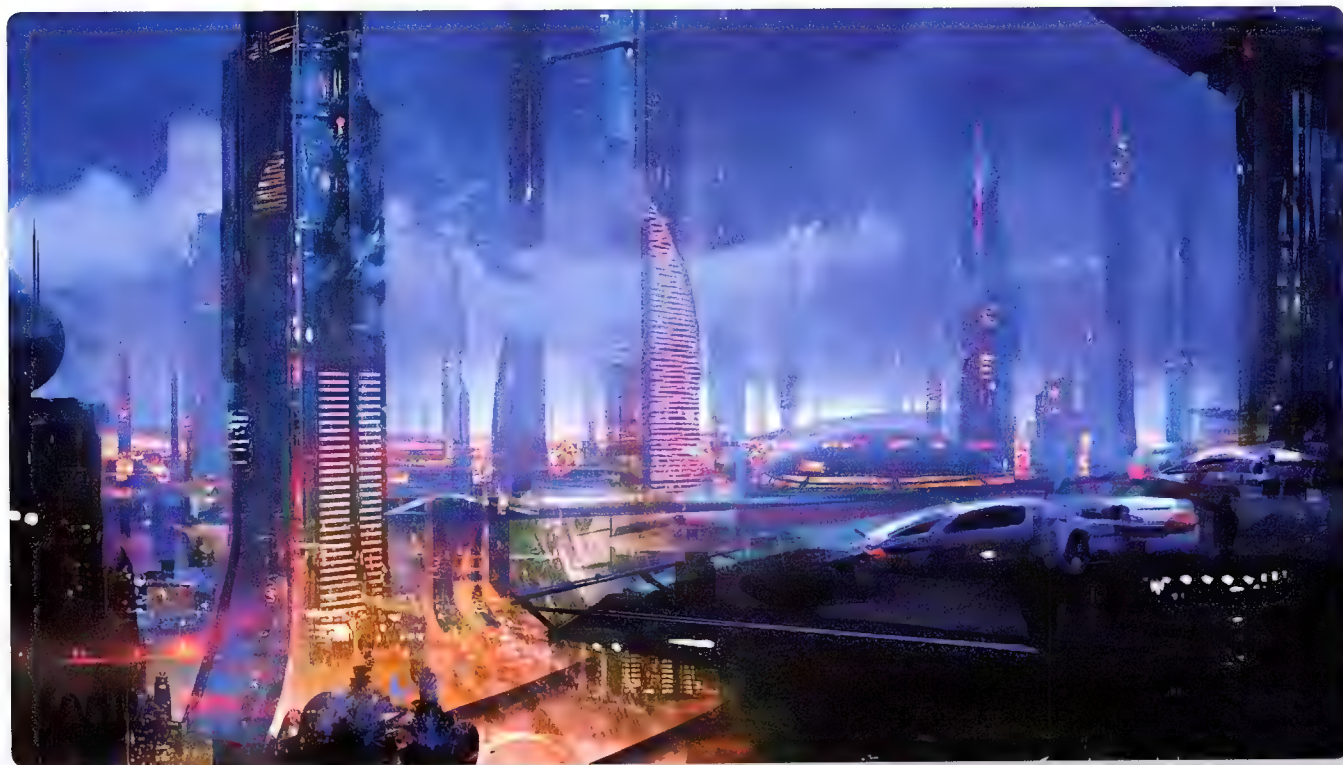
Armour in particular is a huge departure – characters now retain their signature armours, and only odd bits of gear will be added, like helmets or special targeting visors.



It seems like an odd move to take out what is usually one of the best elements of an RPG – the mixing and matching of better gear – but BioWare makes it work.

Another thing that is vastly simplified are character skills. Each character now only has about a half dozen skills, each with only four levels of specialisation. Weapon and healing skills are gone, leaving behind only the most interesting and flavoursome of talents, like the ever so shiny Warp and other Biotic skills. Again, it might seem that taking stuff away runs counter to the idea of making a better sequel, but the simple approach to the game's mechanics allows you focus on what Mass Effect is all about.

Blowing stuff up, and an amazing story populated with memorable characters.





But the true shining heart of ME2 is its story, replete with heroes and villains (who are sometimes neither, and often both), romance, drama, and some of the best Sci Fi writing outside of an Alastair Reynolds novel. It ties so deeply into the first game that at many times you'll really be thinking that this is, rather than a sequel, simply the most complete pack of extra content ever released. And with the mechanics so carefully pared back, the story – and the role you play in it – can really come to the fore.

In fact, it's easy to forget that this is a game at all. If ever a western game deserved the often sniggered at title of 'interactive entertainment', it's Mass Effect 2. Game of the Year, though? Well, BioWare's set the bar pretty damn high. **DH**

A stellar cast

BioWare's assembled probably one of the best, and most nerd-tastic voice casts you'll find in any game. You've not only got all the original voice talent (and Seth Green just gets funnier and funnier), but they're joined by Chuck's Yvonne Strahovski and Adam Baldwin (but he'll always be Jayne, to us), Battlestar Galactica's Michael Hogan and Tricia Helfer, and Star Trek's Michael Dorn, as well as The Matrix's Carrie-Anne Moss.



And, for sheer awesomeness, a major character is voiced by none other the best President of the United States ever – Martin Sheen! And they're all excellent, too – this is the rare game that's as much a pleasure to listen to, as play.

Space operatic

When Mass Effect finally came out on PC, the game really did feel as though it had found its true home, and that's even more the case now. With a revamped cover system, more aggressive squadmate AI, and locational damage (BOOM! Headshot!), ME2's action is more tactical than ever. The addition of limited ammunition, and more weapon types (like the range of awesome heavy weapons you can unlock), also makes for a more thoughtful approach to taking on the enemy, whether it's the insectoid Collectors or the savage Vorcha, or any number of foes old and new.

The squad command system is much more streamlined now, too, thanks to the restriction in powers – and ME2's tighter AI will also use those powers much more cleverly, with quicker cooldowns meaning more powers at your disposal at any one time should you still feel the need to pause the action and give out orders.

Finally, you can easily order your two squadmates about the map using the Q and E keys – setting up ambushes and crossfires has never been simpler, or, with some of the beastly new powers (like being able to trigger a string of up to a dozen singularities in a straight line – ouch!), nastier.

PC, Xbox 360 (reviewed on PC)

Developer BioWare
Publisher Electronic Arts
Website www.masseffect.bioware.com

Graphics

A solid improvement, though the lack of Anti-aliasing on PC is odd.

94

Gameplay

Streamlined, and full of action and moral choices, powerful storyline.

98

Sound

Awesome music, unsurpassed voice acting. Simply perfect.

100



Overall
Another mighty achievement in RPGs for BioWare, and another must-buy game.

99%

MOVIE REVIEW

Moon

The other great science fiction film from last year.

Director Duncan Jones

Starring Sam Rockwell, Kevin Spacey

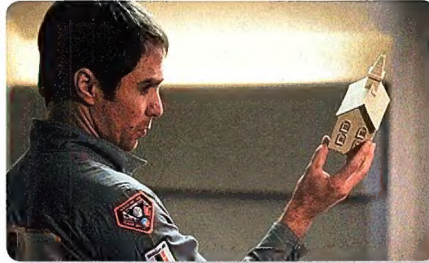
We normally relegate new disc releases to Disc of the Month below, but since we missed *Moon* at the cinemas last year, and it's out this month, we figure it deserves proper billing.

One of the best films we saw last year was Neill Blomkamp's dystopic *District 9*. It was a dark, dystopic, and altogether, chillingly real. It was a thoughtful film that does what SF has always been able to do well – to step back from our own situation, and in doing so see real truth.

It also had people getting killed by levitating pigs and lots of exploding heads, so it was hitting hard on a lot of levels.

But 2009 was a pretty amazing year for SF, and we're now hard pressed to say just what the best film of the year was. Certainly, Duncan Jones' *Moon* deserves to be up there.

Moon is a much more intimate piece than a lot of movies – it harkens back to some of the great SF cinema of the seventies, with lone or



nearly alone protagonists stuck in the middle space/a planet/wherever trying to cope with existential blues as much as they are coping with the plot.

Moon goes one better, and actually makes the existential crisis the entire plot – and stunningly so.

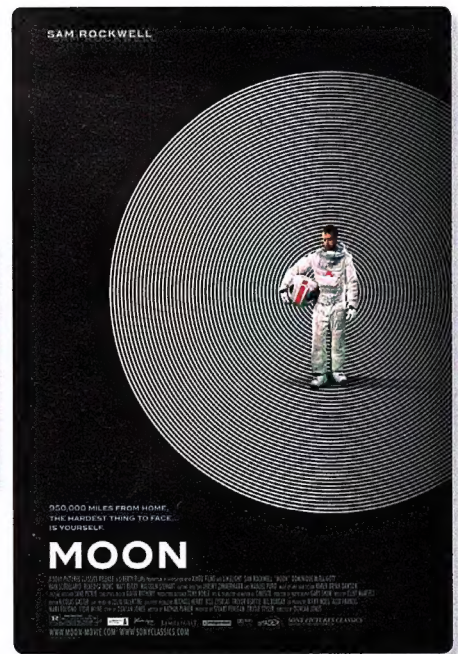
Sam Rockwell plays Sam Bell, just about three years into his three year contract to operate a Helium mining operation on the lunar surface. It's a rough life – the mining vehicles require constant upkeep, the comms satellites are down (meaning no real-time comms), and his only company is a friendly AI played with HAL-like charm and simplicity by Kevin Spacey.

He misses his wife and child an awful lot, and all he has to keep himself mostly sane is the hope that soon he'll be going home – but that all changes following an accident out on the surface...

Saying more would give away too much.

What we can say is that Sam Rockwell has never been better, and delivers a truly stunning though understated performance. He's pretty much on screen the entire time, and he never once loses the audience – by the end of the film, you'll be rooting for Bell more than you will most action heroes.

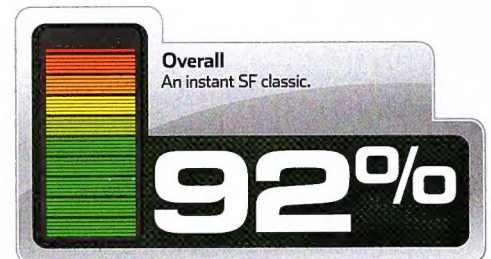
A lot of kudos has to go to Jones, too, who made the film on a limited budget and under some serious constraints. The moon base – the film's main set – was a closed space, not the usual open set, so filming had to operate around



this very real environment. And that set design is wonderful, evoking the stark whites of Ridley Scott's *Alien* while still presenting an utterly believable space for Rockwell's Bell to inhabit. Particular special mention must also go to Clint Mansell's incredible soundtrack – a wonderful mix of his staple electronic sounds with more conventional scoring techniques, and it matches artfully to Jones' lonely vision.

And this really is a film made for Blu-ray – from the detail to be picked up on the moonbase set, to Sam Rockwell's subtly expressive performance, *Moon* deserves to be watched in HD.

More importantly, it simply deserves to be watched. **DH**



DISC OF
THE MONTH

During the time we weren't busy being slackjawed in amazement over *Moon*, we managed to find some time to catch up with some recent releases and classic re-releases.

District 13 (no relation!), is a Luc Besson-written action film that came out in 2004 and is just getting a Blu-ray release – and well worth watching it is, too! You're not going to get anything like great acting, but you will get a lot of inspired martial arts and parkour action – in fact one of the form's founders plays a main character, and the stunts and tricks he pulls off are nothing short of stunning. It'd be great to watch with the opening chase in *Casino Royale*.

However, fun as that was, our heart very much belongs to the Blu-ray release of the John Carpenter classic, *Big Trouble in Little China*.

Though it was flop at the cinema in 1986, when it first released, this is a film that truly deserves its cult following, and it only gets better – and joyously cornier – with age. From the oh-so-earnest Jack Russell as trucker-turned hero Jack Burton, to the cheesy dialogue and basic wire-work effects, *Little China* is a wonderful pastiche of American cinema with Asian sensibility. And it's a great print, too, though it doesn't do some of the effects work any favours.



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A single player

Ben Mansill used to think PC gaming was his own dirty little secret.

Imagine you've discovered just the most amazing thing ever. A thing you never knew existed, but now wraps up your life because it's just so wonderful. You're bubbling and bursting out of your skin to share the joy. It's the veritable standing-on-a-mountaintop-declaring-your-love kinda feeling.

But you're all alone with your buzzing joy. Try as you might, you just can't get anyone to give a shit about your major discovery. Well, that's what it was like to be a PC gamer back in the early days.

See, regular people – and I used to be one – would spend their nights boozing and chasing booty. They'd go to the footy on weekends, or watch the cricket horizontal on the lounge all weekend. While all that was going on I'd be upstairs clocking hour after hour playing the week's latest amazing game, lost in the magic, high on the neat feeling of escapist worlds to serve my imagination, and the cool thrill of 'having a computer'.

There was no internet – so no forums, email, chat or the rest of what we use to network to the buggery. When I did venture away from the computer and back to socialising again, the group would all talk about what they'd been up to. I'd offer, in a hesitant voice, "Well, there's a Russian carrier battle group heading down past Greenland that's been worrying me, but I've got subs out and rotating CAPs that should pick them up, then I'll hit them with a land-based airstrike supported by Tomcats off my carrier", hoping someone



The reclusive personal experience.

The only other place you could go was the local computer shop. These crazy box-stacked hives of angry hyperactivity were the least welcoming places in the world. Browsing was impossible, if you didn't know exactly what you

Dummies sold its ugly yellow arse off.

Of course, gaming was all about single-player. What else was there? Once, I managed to get a computing (but non-gaming) mate to agree to play some Geoff Crammond's Grand Prix via the null-modem cable support it offered. God, what a nightmare. First I had to get an electrician mate to actually make me a null-modem cable, I think I was the only one in the world that had one – or at least that's how it felt. Then, packing the PC up and driving over to the mate's place, half a day getting it to work, followed by 30 minutes of him driving around the track backwards trying to ram me, before he got bored and gave up. God damn. Was PC gaming going to be like this forever?

Then I got lucky and got a job in the biz. Me, the 20 or so other employees, and the 50 or so regular customers comprised what I reckoned to be the entire PC gaming population in the country. The truth, of course, is that there were countless thousands of others left alone to enjoy gaming and solve their own problems.

As times changed, and PC gaming moved from being a weird little computing tangent through the supernova explosion of the internet, part of me loved and embraced this newfound expanded family. Part of me, though, missed the personal private secret that was imposed unavoidably for so long. Standing atop the mountain, declaring my love for gaming was for a long time met by comfortable silence. Now, mine is a voice lost in the noise of millions of others. Getting what you've always wanted oddly makes you miss what you once had... 

These crazy box-stacked hives of angry hyperactivity were the least welcoming places in the world.

anyone would perk up and say "I know it man! Harpoon! Unbelievable game!". But alas, sadly that never happened. For several years gaming was a thing almost to be ashamed of. Gaming was the novelty offshoot that PC owners (who had bought it to run the business, or for kids homework) indulged in, but for just a few minutes at a time, anything more was weird and obsessive.

Except for my mate at the Gamespot shop in the city. That was sanctuary, a place of belonging. I'd go in almost every day, feeling acceptance wash over me as I passed through the door. PC gaming was healthy then, creative, original and awash with new releases. Every shop visit meant new games on the shelves. Most weeks I'd buy something, and I remember making a personal pact with myself that I'd play and master every single new PC game. For a couple of years at least, that was doable.

Leaving the shop, it was back to isolation.

wanted there was little point being there. God help you if you actually had a problem with something you'd bought. The shop stance was defensive, aggressive, impatient. Tell you what – folks may knock Harvey's now for friendly but weak advice, but I would have fallen at their feet, had they been an option then.

But what really killed wasn't so much the need to share excitement, it was the total lack of anyone to talk to when there was a problem. If a game didn't work right, you had limited options. You could call the distributor (see last month's column!), or trek into town and see the shopbloke. All a bit of an effort, and unless the one person you were likely to talk to had the answer, you were stuffed. Back then I bought every single issue of Australian Personal Computer. It was all there was, and it served the addiction well enough, if only a dozen pages each month were relevant. No wonder DoS for

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MATS Systems 08 8262 7134 pcplus.com.au
WA 08 9309 4771 ple.com.au
PLE Computers 08 9201 2788 austin.net.au
Austin Computers
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Computer Lounge 09 368 4818 computerlounge.co.nz
DTC 09 623 4988 dtconline.co.nz
PC Force 09 962 5620 pcforce.co.nz
XP Computers 09 529 9196 xpccomputers.co.nz
CHRISTCHURCH 0800 222 691 cbcnz.co.nz
Custom Built Computers 03 366 6621 dragonpc.co.nz
Dragon PC
HAWKES BAY 06 870 6136 pcxonline.co.nz
PCX
ROTORUA 07 349 0480 xthree.co.nz
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